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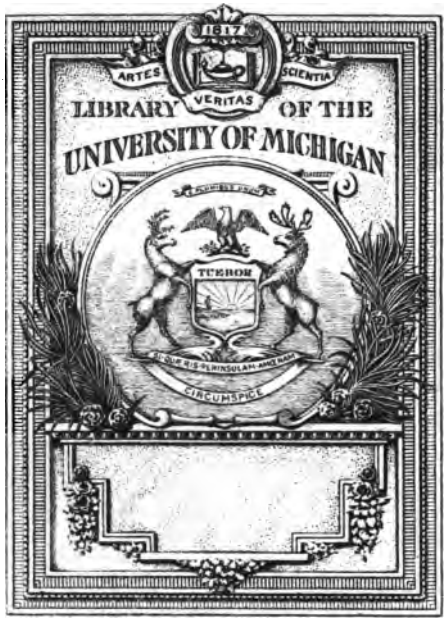

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NAVAL POWER IN THE WAR

COMMANDER C. C. GILL, U. S. NAVY

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NAVAL POWER IN THE WAR

(1914-1918)

BY
C. C. GILL
COMMANDER, U. S. NAVY

MAPS AND DIAGRAMS

NEW YORK
GEORGE H. DORAN COMPANY

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PREFACE

THE purpose of this study is to show the decisive rôle of naval power in the war. The scope of the narrative is limited to the more important naval events. These are discussed not so much with a view to completeness in detail as with the view of making clear points of policy, strategy, and tactics necessary to an understanding of the general principles governing the size, composition, training, and uses of modern fleets.

In the year that has passed since the original manuscript went to press the only major naval operation which has taken place is the overseas transportation of United States troops. This is covered in an additional chapter under the heading, "The United States in the War." Extensive notes have also been appended to this chapter describing other war activities of the United States Navy.

Since the battle of Jutland, war on the sea has not been marked by any major contact of fighting forces. Occasional raiding expeditions with attending light cruiser and destroyer engage-

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ments, together with submarine encounters, comprise about all that has been heard from the silent, though busy, navies. A noteworthy instance of recent sea fighting is the brilliant attack by the British against Zeebrugge. Another example is the exploit of the Italian Navy in torpedoing Austrian battleships at anchor in the harbour of Trieste. These are interesting enough in themselves and by no means inconsequential, but do not find a place in this work, which is limited to the major operations of the war.

Since the publication of this book, moreover, there have not been any disclosures or developments of such a nature as to demand revision of the original text. Advantage has been taken, however, of the opportunity kindly afforded by the publishers to bring statistical data up to date, to perfect diagrams, and to make a few minor changes in arrangement and wording. With the exception of the additional chapter, the main body of the book remains substantially the same as when first published.

The twelve chapters, with one exception, were contributed to *The New York Times Current History Magazine*. The exception is the sixth chapter—The Dardanelles Operations—which was written to complete the series covering the major naval operations of the war.

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The author takes occasion to extend his acknowledgments and thanks to the editors of *The New York Times Current History Magazine* for permission to republish, which they have kindly given.

Acknowledgment is also made to Allan Westcott, Ph.D., Instructor in the United States Naval Academy, for maps and diagrams contributed and for help given in editing the text. Sincere thanks are expressed to Mr. T. G. Frothingham, to the Staff of the English Department of the United States Naval Academy, and to the Officers of the *Oklahoma* and the *Seattle* for many helpful suggestions cordially given throughout the progress of these studies.

C. C. GILL.

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INTRODUCTION

The present volume had its origin in lectures delivered by Lieutenant Commander Gill at the United States Naval Academy in the winter of 1915-16 to midshipmen who have since been graduated and are now in active service. For this audience, the facts and lessons of recent naval history had a special significance, as a very practical preparation for the responsibilities they were soon to undertake. To quote the words of Napoleon, "The happiest inspiration in battle is often a recollection of the past."

The discussion was afterward continued in *The New York Times Current History Magazine*, and, with the sanction of the Navy Department, is now published in book form. In selecting and preparing the material, the author had in mind not only the special needs of young naval officers, whether midshipmen or volunteers now entering the naval service, but also the general popular interest in naval affairs. The book is to be used this year by the Department of English at the Naval Academy in the teaching of naval history.

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Undertaking these studies before the entry of the United States into the war, the author has maintained throughout the standpoint of the technical student of naval warfare, rather than that of the philosophical historian. Needless to say, he is not without strong sympathies and convictions; but these, from the nature of the investigation, are subordinated to the search for truth. In other words, the book is not partisan and is not propaganda; it has no special thesis to maintain —except an underlying belief in the importance of naval power to a nation whose boundaries are the two oceans, and whose interests extend throughout the Seven Seas.

The wisdom of attempting to write naval history at such close range may be questioned. The question may be answered by pointing out that the book aims to draw the significant naval lessons, rather than to chronicle events in minute detail. Whatever the paucity of the data, it is important that these lessons should be drawn immediately. Frank discussion clears the air.

There is an advantage also in the contemporary point of view, with its appreciation of concurrent events and the feeling of the hour. If distant perspective gives proper proportion, it also throws a haze over the scene. And in naval history particularly, the facts are not always clearer with the

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lapse of time. Historians a century ago could have determined, more easily than it can be determined to-day, the exact manner in which Nelson brought his fleet into action at Trafalgar; and a century ago there was a recognition—more instinctive and less reasoned, perhaps, but not less genuine than to-day—of the greatness of that victory and its meaning in the Napoleonic War.

Students of naval history, therefore, may feel indebted to the writer for this book—written under pressure of duties afloat which since our participation in the war have left slight leisure for outside work.

Allan Westcott,
Department of English,
U. S. Naval Academy.

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NAVAL POWER IN THE WAR

CHAPTER I

Naval Power in the War

NAVAL activities comprise:—constructing, arming, and fitting out men-of-war; the supply and training of the commissioned and enlisted personnel; the operation and upkeep of the fleets; and the maintenance of the necessary navy yards and stations at home and abroad. Merchant marine activities, placed largely under control of naval strategists by war measures, include:—The ship-building plants; the facilities for fitting out, docking and repairing merchant ships; depots for handling merchandise and passengers in home ports and foreign ports of call; the merchant fleets; their personnel; and the agents and machinery used in the management of ocean traffic. The material used in these activities involves the industries of mine,

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field, forest and work shop. Exports and imports, emigrants, and immigrants, when carried in ships, are also factors of Sea Power.

In the war just ended the transportation and supply of the Allied armies depended on naval power. Naval strategy was the grand strategy of the war.

Allied naval strategy aimed at the gradual exhaustion of the enemy. The ultimate success of this strategy was foretold by two striking examples from History—the Napoleonic Wars and our own Civil War. In the Napoleonic Wars the pressure of British Sea Power prostrated the industry of France, broke her spirit of aggression, and prepared decisive tactical victories in the field. In like manner during our Civil War the pressure of the Union blockade cut off the Southern armies from their source of supply, destroyed the hopes of the Confederacy, and paved the way to Grant's victory and the ensuing peace.

The two most conspicuous naval actions in this war, the Battle of Jutland and the attempt to force the Dardanelles, were disappointing in results. At Jutland the German High Sea Fleet, although damaged, escaped the clutches of the British Grand Fleet, and at the Dardanelles the Allied offensive to gain control of the approaches to Constantinople and Russia's Black Sea ports

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was a failure. As a consequence, in some quarters dissatisfaction led to criticism of Allied naval strategy as a whole. To be sure, complete successes at Jutland and the Dardanelles would have greatly promoted the aim of Allied strategy; but care should be taken to assign the proper causes to tactical failures.

Due weight should be given Allied naval achievements:—Restriction of German and Austrian battle fleets; destruction of enemy cruisers abroad; annihilation of enemy merchant marine activities; stoppage of enemy supplies from oversea sources; defeat of the enemy submarine policy; transportation and supply of the western armies:—In short, the vitalisation of Allied forces and the devitalisation of enemy forces. These were the decisive factors in obtaining victory.

Even with the event so near it may be safely stated that the surrender of the German Fleet without firing a shot was the spectacular culmination of the greatest naval achievement in history.

Naval power in the war was exerted for the most part behind the scenes. It is hard to realise that the achievements of the Allied fleets, accomplished with so little fighting, proved, in their influence upon the war, more important than the much heralded land battles involving enormous

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loss of life and property. The German Government admitted this potency of sea power, when, in April, 1917, Hindenburg announced that it was only necessary for the German armies to hold their own on land while on the sea the U-boats hemmed in Great Britain and so crippled the ocean trade supplying men, food and munitions to Allied armies as to compel the acceptance of peace terms pleasing to the Prussian leaders.

It is strange that Germany's first soldier should have made the point, that the submarine, the only naval weapon able to evade the Allied blockade, promised a respite and a hope that the German armies could not give, even though the latter had been successful on all fronts and had conquered entire countries. Thus Germany recognised the principle well taught by the distinguished American naval officer, Admiral Mahan, that in all great wars between commercial nations land power is ancillary to sea power.

In this war, as in past wars, the force of sea power slowly but surely shaped the issues. As the arteries of sea-borne commerce to the Teutonic Powers were more and more effectually blocked, and as the U-boat terror subsided while new strength from America, Africa and Asia was transported more and more easily to France, England and Italy—the realisation was slowly but surely

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forced home, that Pan-Germanism could not be realised.

In following the developments of the great war it is of interest to note that in the main nothing startling happened to upset expert predictions, either as to the part sea power would take, or as to which of the belligerent navies would dominate. In the course of the fighting there were no great surprises. Generally speaking, results corresponded with the degree and kind of peace time naval preparation made by the warring nations.

The statement that there were no great surprises should be modified by one exception, submarine warfare against merchant ships. Before the British blockade forced Germany to plan her unscrupulous submarine campaign against commerce it is doubtful if any country, not excepting Germany, ever thought seriously of such a campaign as a contingency of modern civilised war. It came therefore as a surprise, and its temporary success was due to the fact that in the years of pre-war time development of the submarine there had been no contemporaneous development of naval weapons to combat it as a commerce destroyer. The submarine had always been looked upon as a lawful weapon for use against enemy fighting ships, and its meagre suc-

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cess in this capacity shows that the preparations made against it were adequate; but the submarine as an unscrupulous commerce raider had thirty years' start of the weapons designed for use against it in this new and unexpected rôle. If it had been foreseen that submarines would be used in this way, step by step with the development of underwater craft, there would have been a corresponding improvement in scientific contrivances for safeguarding commerce; and had this been the case it is reasonable to suppose that the U-boat would never have reaped its grim harvest of peaceful shipping.

So this exception goes to prove the rule that naval weapons both for offence and defence are highly scientific products resulting from long years of development. There is always the chance, of course, that one side or the other will hit upon some revolutionising invention. Nor does it necessarily follow because none appeared in this war that none will appear in the future; but there is, nevertheless, evidence that in shaping a policy of defence it is safer to heed the lessons of experience than to rely on a mere theory of inventive abilities adequate to meet any situation.

Neither an army nor a navy can be improvised, but it is an important difference between them that an army can be prepared more quickly and

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easily than can a navy. At the outbreak of this war Great Britain's army was small, but her powerful fleet was ready. Under the protection of this first line of defence a great army was recruited from British possessions all over the world, and equipped, and trained. Navies cannot so readily be built up; it takes years to construct a battleship fleet and train the personnel to fight it. When the war began Germany's army was ten times as strong as Great Britain's army, but four years later this difference had disappeared. On the other hand, in 1914 Germany's sea power was about two-thirds the strength of England's sea power, and when the armistice was signed England had increased this lead. It takes so long to build fighting ships, and the demands on a nation's resources are such that Germany was unable to construct during the war a fleet to rival that of her enemy. But it is different in the case of land forces. Great Britain rapidly overcame an initial discrepancy in armies much greater than was the naval discrepancy facing Germany in July, 1914.

Careful analysis of the battles fought in previous wars has contributed much to naval science, and the general theories previously deduced have been verified by the events of this war. There is, however, by reason of improvements in ships and weapons, continuous change in the conditions af-

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fecting the application of strategic and tactical principles. This makes it advisable to alter rules of practice in the light of lessons learned from day to day. In attempting this concurrent study of naval operations of the great war, the handicap of insufficient and unreliable data is admitted, but even if some of the premises are slightly in error, still, the inferences drawn will have value so long as they are logical and square with accepted naval opinion.

Secrecy forms an important part of naval strategy and is favoured by nature. The sea isolates and frequently swallows up all testimony of the fighting done. Hence the Admiralty announcements of both sides have been laconic. There is, however, plenty of evidence that the silent navies were not idle. This is indicated by a summary of the losses sustained.

It is reported that in first line ships Great Britain and her allies lost ten dreadnoughts and sixteen pre-dreadnoughts, while Germany and her allies lost three dreadnoughts and seven pre-dreadnoughts. The Allies lost twenty-two armoured cruisers and twenty-four light cruisers, against seven armoured cruisers and twenty-four light cruisers lost by the Central Powers. In other types the figures are less reliable, but the Allies lost about seventy-three destroyers, twenty torpedo

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boats, forty submarines, and ninety converted cruisers and auxiliaries, while the Central Powers lost about thirty-nine destroyers, twenty-six torpedo boats, between one hundred twenty-five and one hundred fifty submarines, and forty-five converted cruisers and auxiliaries. In addition to these, both sides lost numerous small craft, including air scouts, patrol boats, yachts and mine sweepers.

This list of losses, however, indicates only a part of the naval work accomplished. Difficult and important operations are frequently unattended by losses. A complete narrative of the war would include not only the engagements fought, but in addition all the activities incident to mobilising, blockading, commerce destroying, transporting, convoying, patrolling, scouting, raiding, and mine laying. It will be many years before the data for such a work will be available.

The scope of this brief study is limited to the more important naval events. These are discussed not so much with a view to completeness in detail as with the aim of bringing out the points of policy, strategy, and tactics necessary to an understanding of the general principles governing the size, composition, training, and uses of battle fleets. These principles are important as the starting point from which more difficult scien-

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tific deductions proceed. To determine the latter is the function of naval experts who have devoted years to the exhaustive study of technical naval problems. The former comprise a portion of general knowledge which even a casual student of world politics can ill afford to neglect.

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CHAPTER II

Definitions and Estimate of the Situation

Sea Power—Sea Control—Plans of Warring Navies

SEA POWER

THE sea power of a nation may be said to comprise all its means for contesting the control of the sea. It includes the battle fleets and their auxiliaries, cruisers, destroyers, submarines, aircraft, also naval bases and stations, fortified or naturally protected harbours, coast defences, the merchant marine (embracing armed and unarmed vessels engaged in commerce and passenger traffic), in short, everything the country possesses that may be useful, directly or indirectly, for the purposes of naval warfare.

Big-gun ships comprise the main reliance in battle and are known as "dreadnoughts." These are divided into dreadnought battleships and dreadnought battle cruisers, the difference between the two being that a certain amount of the gun power and armour of the battleship is sacrificed

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in the battle cruiser in order to get speed. Pre-dreadnought battleships differ from dreadnought battleships in that, instead of carrying all big guns and torpedo defence guns, they carry some big guns and some smaller or intermediate battery guns, thus tapering down to the torpedo defence guns. The armoured cruiser carries a mixed calibre battery like her running mate, the pre-dreadnought battleship, but is faster by reason of having less armour and less powerful guns.

Both pre-dreadnought battleships and armoured cruisers are discredited as shown by the fact that no more are being built, but they are by no means useless and still form an important part of the strength of the more powerful navies. The light cruiser, used for commerce destroying and scouting, is a fast vessel without armour and carries torpedoes as well as a light battery of intermediate calibre guns. The light cruiser type, which has shown considerable usefulness in the recent war, may be regarded as a development of the torpedo boat destroyer, as it is larger, more seaworthy, more habitable and better armed. The torpedo boat is a smaller edition of the destroyer, and the submarine requires no definition. An auxiliary cruiser or a converted cruiser is a merchant ship or private vessel requisitioned by the Government for naval purposes. Such a vessel is usually

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armed for both offence and defence. She loses her character of a merchant ship engaged in peaceful pursuits and becomes a part of the fighting navy with the status of a regular man-of-war.

On the other hand, an armed merchantman is armed simply for defence. She is not a part of the fighting navy, and her character is determined by her employment. If she is still engaged in the peaceful pursuits of trade the fact that a ship carries one or two guns for defence only does not change her character into that of a man-of-war.

Strategy and tactics comprise the science and art of using sea power. The word strategy conveys the idea of preparation for the fighting and tactics that of execution of the fighting. But before discussing the points of naval strategy and tactics exemplified in the present war, it is well to explain the uses of naval power and to outline the maritime situation in July, 1914.

SEA CONTROL

When nations of maritime importance are at war, relative control of the sea, or certain parts of the sea, belongs to the belligerent whose sea power dominates the areas in question. For example, it is generally considered that from the beginning of the war the Allies had control

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of the Atlantic. This does not mean that the maritime operations of the Central Powers in these waters were literally extinguished. It would appear impossible, in the face of an enterprising and resourceful enemy, to prevent completely the operations of submarines and occasional commerce destroyers. But since these did not materially affect the maritime operations of the Allies it is proper to say that the latter controlled the Atlantic. There are varying degrees of sea control, and the more extensive the submarine and commerce destroying activities of the weaker belligerent, the less completely does the stronger enemy control the sea areas in question.

Theoretically, in times of peace at least, the seas are free to all, but even then certain areas are said to be potentially controlled by certain nations by virtue of their relatively superior sea power in these respective waters. The superior sea power of Japan in Asiatic waters gives her in peace times what might be called potential control of those seas, and it may be assumed that this potential control increases the weight of her voice in international affairs of the Far East.

In times of war also the potential sea power of neutrals may easily prove an important factor. At the beginning of the present war had the United States possessed a navy superior to the

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navies of the Allies, although, relatively speaking between the belligerent powers, the Allies would still have controlled the Atlantic Ocean, the superior sea power of the United States would have given this country a potential control of this ocean, which might have affected the conduct of the maritime operations of all the belligerents, particularly in matters concerning the lawful interests of the United States.

International law is not very clearly codified, and it is natural that different nations should look at things from different angles. This means that when great wars are going on potential sea power may prove especially valuable in securing respect for neutral rights.

At the beginning of the war the Allies had superior sea power and consequent potential control in the Atlantic, Pacific, Indian Ocean, Mediterranean Sea, Black Sea, North Sea—in short, in all sea areas excepting those adjacent to the ports and naval bases of the Central Powers, namely, the Adriatic near Austria's ports, the North Sea and the Baltic adjacent to Germany's ports, and the Sea of Marmora, the Dardanelles, and the Bosporus, under the control of Turkey.

Another estimate of the situation at the time of the armistice shows no material alteration other

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than the extension of enemy naval control in the Baltic and Black Seas incident to the collapse of Russia. The fighting, which changed the potential control into active control, followed a course quite to be expected, and with the exception of the lawless destruction of commerce by submarines, maritime operations were singularly free of surprises. The Allies made a notable attempt to wrest control of the Dardanelles, Sea of Marmora, and Bosporus from Turkey and her allies, but it failed, and, with the exception of the battle off the Jutland Peninsula, there has been no other active struggle to alter the areas of sea control as determined by the pre-wartime disposition of sea power. Manifestly, from the beginning the naval situation was disadvantageous to the Teutonic Powers. Notwithstanding this, the sea power of Germany, the part taken in the war by enemy fleets, and the waters they controlled were far from negligible. Besides keeping the Allied fleets at a distance and hampering commerce by the use of submarines, enemy naval command of the Baltic and the entrances to the Black Sea by blockading the principal ports of Russia contributed in large measure to the downfall of that country.[1]

[1] The German advance in the Baltic Sea against the Russian defences guarding the Gulf of Riga would properly be classed as a major operation, except that, by reason of Russian disaffection, this advance took the form of a strategical manœuvre without noteworthy fighting.

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PLANS OF WARRING NAVIES

Broadly speaking, Great Britain's plan of naval campaign at the outbreak of hostilities aimed:—first, to destroy the enemy fleets with superior forces, or, failing in this, to confine the enemy fleets and restrict his trade by a system of distant blockades; second, to convert potential control of the high seas into active control by destroying, capturing, or bottling up enemy men-of-war operating on foreign stations.

On the other hand, the weaker German and Austrian navies instituted a different kind of campaign. The Teutonic powers planned:—first, to operate the home fleets so as to protect their coast lines and control as wide as possible sea areas beyond, thereby preventing a close blockade and permitting commercial intercourse with neighbouring neutral countries; second, to use their naval vessels abroad to inflict the greatest possible damage on their enemies before being cornered and destroyed by superior Allied sea power or escaping to the shelter of home or friendly ports,

While the German expedition was carefully planned and well executed, Russia does not appear to have offered any organized resistance. The Germans made the voyage to the scene of operations without molestation. Although fighting occurred during the occupation of the Russian coast and outlying islands, the defence was haphazard and ineffectual. Under the circumstances no tactical conclusions can be drawn. Strategically the position of Germany in the Baltic was greatly improved. With the fall of Reval, the Allies lost their Baltic submarine base, and Germany gained practically undisputed control of all these waters.

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as was the case when the *Goeben* and *Breslau* eluded numerous enemy ships in the Mediterranean and steamed safely through the Dardanelles to Constantinople; third, to interfere with and damage enemy commerce by means of submarines and commerce destroyers, such as the *Moewe;* and fourth, the Teutonic powers planned to lessen the disparity of force between their navies and the superior navies of their enemies by so-called attrition warfare, harassing and menacing the enemy in all possible ways, instituting raids with fast air and sea squadrons, attacking with mines and torpedoes, and watchfully seeking opportunity to fall upon a detached portion of the enemy fleet with a superior force.

How did these plans work out? What did Teutonic sea power accomplish? What did Allied sea power accomplish?

Early in the war German commerce destroyers, of which the *Emden* is a historic example, did considerable damage to Allied shipping. Turkey, aided by Germany, defeated the Allies at the Dardanelles, where a costly attempt was made to wrest from Turkey waterways over which she had exercised authority practically since the beginning of modern history. The potential defensive power proved adequate when put to the test of active resistance. The exploits of submarines as-

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tonished the world. The British shores were raided both by air and by sea attacks. Control of the Baltic and the entrances to the Black Sea effectually blockaded the principal ports of Russia, and made possible the temporary German domination of that country.

But to what purpose? The superior naval power of the Allies slowly but surely swept the German flag from the seas. In the first month of the war, the German cruisers in American and Far Eastern waters were skillfully drawn away from enemy-infested areas and concentrated under the command of Vice Admiral von Spee off the west coast of South America. Here they gained a brief respite by defeating an inferior British squadron. But they were doomed ships, and it was only a question of time before the more powerful enemy navies would find and destroy them. This happened in the Falkland Islands engagement, which took place a month after the German victory off Coronel. With no navy to protect them, the German colonies were captured one by one. On the other hand, the colonies of the Allies were secure, and a source of aid and comfort to their mother countries. German submarines inflicted enormous losses but did not succeed in closing the sea highways to the Allies. Supplies and munitions of war constantly

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streamed into their ports. Transports brought their troops from all parts of the world.

It was the pressure of naval power which compelled Germany as a last hope to undertake her lawless submarine campaign against commerce. This precipitated the United States into the war. Again it was the ability of the naval power of the United States to check the submarine menace in the Atlantic which made the money, food, and man power of America transported over-seas to the support of hard-pressed England, France, and Italy the decisive factor of the war.

Naval events in this war, therefore, supplied corroborative evidence to inductions grounded in the experience of past wars, thus clarifying rather than confusing the principles already more or less firmly established. Naval power dominated the military situation. The armies of the belligerent denied the sea were overcome by the armies fed and equipped and supported by means of ocean traffic.

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CHAPTER III

Opening Activities

Strength and Disposition of Fleets—*Goeben* and *Breslau* Episode—Attacks on Cable and Wireless Stations.

STRENGTH AND DISPOSITION OF FLEETS (JULY, 1914)

WHEN hostilities opened, the naval fleets of the countries involved were concentrated in well-defined theatres of operations. Disregarding the small detachments on independent or foreign service, the bulk of Great Britain's fleet faced the German high sea fleet in North Europe, while the French navy was opposed to the Austrian navy in the Mediterranean and Adriatic. Russia's navy had not been rehabilitated since the Russo-Japanese war, but the few ships she had guarded Russian Baltic and Black Sea coasts. The relative strengths of these belligerent navies at the beginning of the great war may be approximately indicated by the following figures.

Great Britain's navy consisted of sixty-three battleships, ten battle cruisers, thirty-four ar-

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moured cruisers, seventy-four cruisers, two hundred destroyers, eighty-five torpedo boats and seventy-eight submarines. Of these, two of the older battleships, three battle cruisers, sixteen cruisers, and a few destroyers were on foreign stations.

Germany's navy consisted of thirty-five battleships, five battle cruisers, nine armoured cruisers, forty-five light cruisers, one hundred and forty-three destroyers, and about thirty-five submarines. This fighting strength was concentrated in home waters except for one battle cruiser, two armoured cruisers, eight light cruisers, and one destroyer on duty abroad.

The French navy comprised twenty-two battleships, nineteen armoured cruisers, twelve light cruisers, eighty-four destroyers, one hundred and thirty-five torpedo boats, and seventy-eight submarines. As early as 1912, the Entente Cordiale between Great Britain and France resulted in the general scheme that France would look out for British naval interests in southern Europe, while Great Britain would protect French naval interests in northern Europe. France had only four cruisers engaged in distant service.

Austria's navy numbered twelve battleships, ten cruisers, eighteen destroyers, sixty-three torpedo boats, and ten submarines. All of these, with the

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exception of one armoured cruiser on the China station, were in home waters.

Table (approximate) of Belligerent Fleets July, 1914[1]

	Battleships, dreadnought type	Battleships	Battle cruisers	Armoured cruisers	Cruisers	Destroyers	Torpedo boats	Submarines	Coast defense vessels[1]
England....	23[1]	40	10	34	74	200	85	78	0
Germany...	15[2]	20	5	9	45	143	0	30	2
France.....	4	18	0	19	12	84	135	78	1
Russia.....	0	7	0	6	9	91	14	30	2
Austria-Hungary..	4	6	0	0	10	18	63	10	6

[1] Assuming 2 Queen Elisabeth class practically completed.
[2] Assuming 2 Koenig class practically completed.

Just before the outbreak of war the British fleet had been mobilised at Spithead, and early on August 4th, the day of Great Britain's war declaration against Germany, this fleet put to sea under sealed orders. Less is known about the exact disposition of the German forces, but probably they were equally ready and concentrated in the vicinity of the fortified bases at either end of the Kiel canal connecting the North and Baltic seas.

On August 5th the British ship *Drake* cut two cables off the Azores, thus severing this means of communication between the German ships abroad and their Admiralty at home. On the same day,

[1] For further details of all the navies finally engaged in the war, see Appendix.

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the crew of a fishing boat reported that they had seen a large merchant ship in the North Sea throwing things overboard. A British destroyer flotilla of four ships was sent to investigate and soon gave chase to the steamer *Koenigen Luise*. A shot across the bow was unheeded, thus confirming the suspicions that the fleeing steamer had been converted by Germany into a mine layer. An engagement lasting about six minutes followed, during which the mine layer was repeatedly hit and finally sunk by gun fire. Fifty of her crew of one hundred and thirty were saved and made prisoners. The next day the British light cruiser *Amphion* struck a mine, probably one of those laid by the *Koenigin Luise*, and was destroyed. On August 9th a flotilla of German submarines made an unsuccessful attack against the light cruiser *Birmingham*, which escaped unharmed after sinking by gun fire the German U-15.

These early happenings give an idea of how the struggle on the seas began. As fast as the war news spread throughout the world the fighting ships and merchant ships of the nations involved proceeded, in accordance with instructions, to modify their conduct and movements to meet the change from peace to war conditions. The German warships at large did what they could to safeguard their own commerce, destroy enemy

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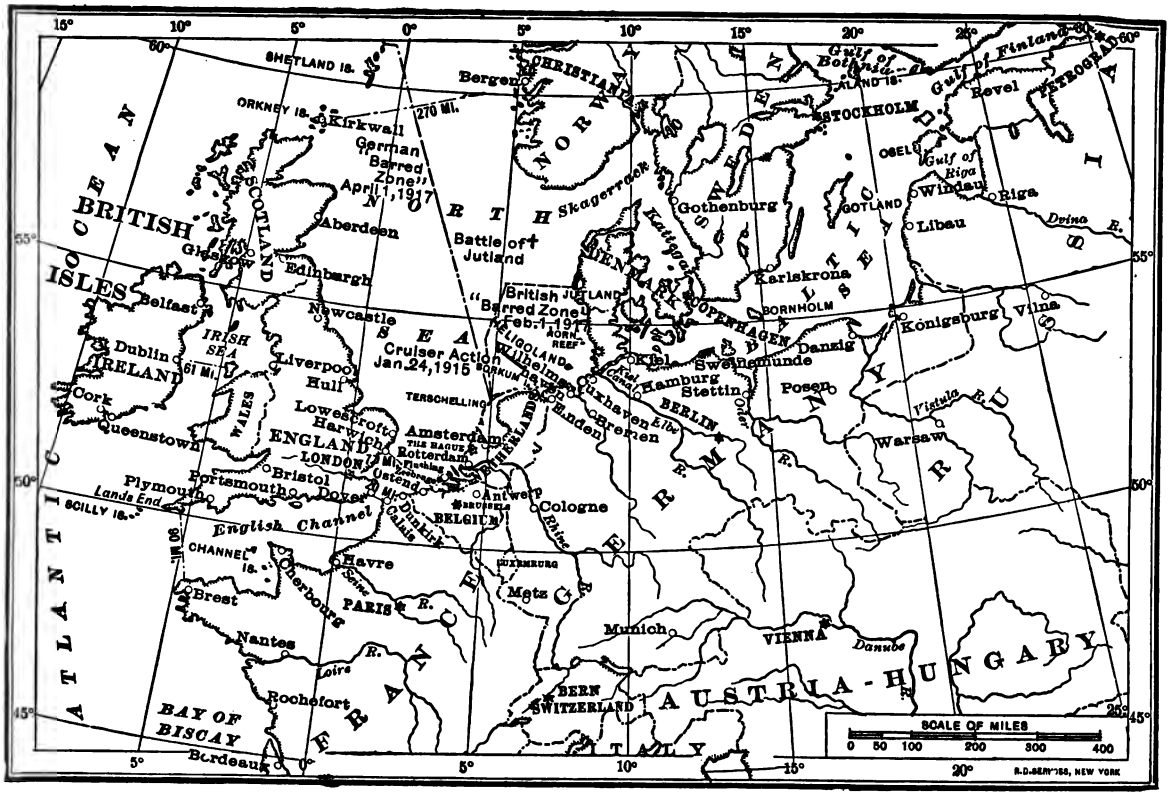
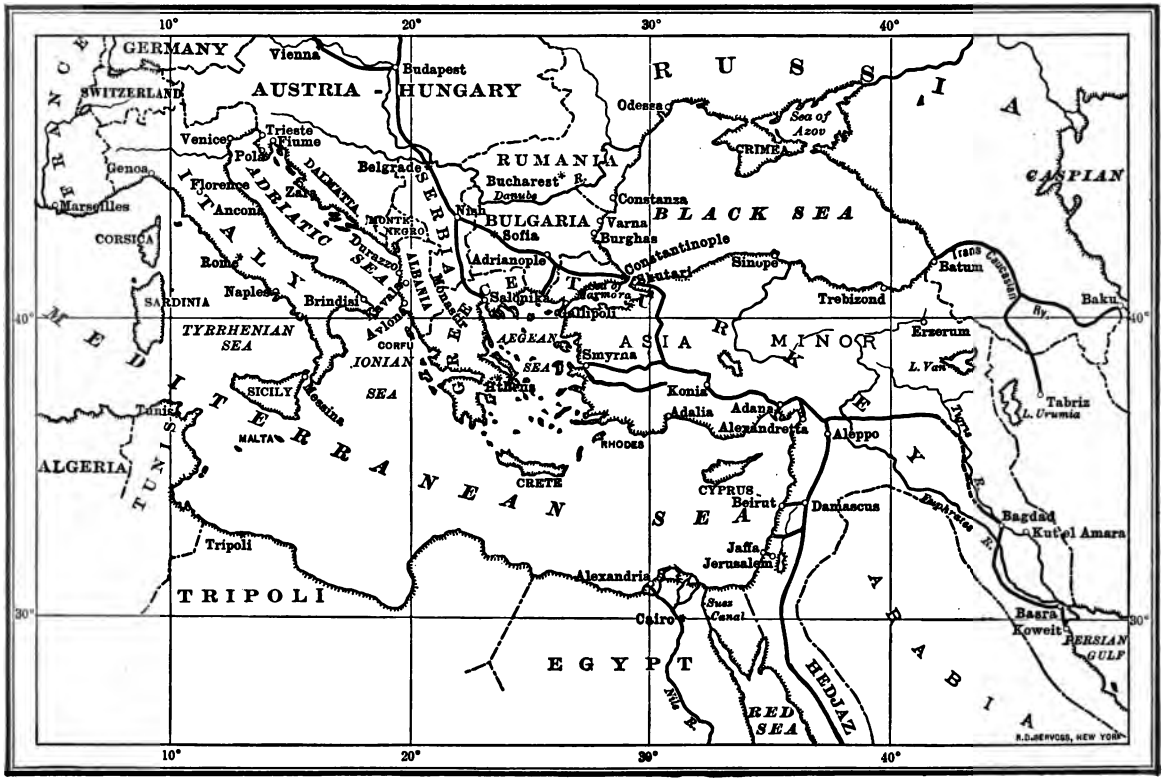


NORTH SEA AND BALTIC



MAP OF THE EASTERN MEDITERRANEAN
(Bagdad Railway Route from Reimer's Kriegsstandkarte, Berlin, 1916.)

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commerce, and evade destruction themselves. The Allied navies set to work blockading enemy coasts, protecting Allied commerce, clearing the seas of enemy flags, rendering assistance to the expeditions sent to reduce German colonies, and transporting troops with their impedimenta from all parts of the world to the fighting front.

Although the primary purpose of fighting ships is to fight, it is readily seen that naval wartime work covers a wide and varied field. Sometimes there are important naval happenings without attendant losses or even without fighting. The escape of the *Goeben* and *Breslau* may be cited as of conspicuous political significance.

"GOEBEN" AND "BRESLAU" EPISODE

It was reported that during the first few days of the war the German battle cruiser *Goeben* and light cruiser *Breslau* bombarded the Algerian coast, sank a few ships in Bona harbour, and then proceeded to Messina, arriving there on August 5th, 1914. It was also rumoured that while off the northern coast of Africa the two German cruisers, when hard beset by enemy forces, escaped during misty weather by the aid of the ruse of placing some musicians on a raft to attract the attention of enemy patrols by playing German

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airs, while the warships laid their course for Messina.

From the pre-wartime disposition of forces it may be assumed that the Allies had in the Mediterranean at this time numerous men-of-war, including very likely two or three British battle cruisers, several fast light cruisers, and many destroyers. International law required that the German warships leave the neutral port of Messina within twenty-four hours. The chances for escape appeared dubious to say the least, and the following version of the manœuvre, purporting to be based on the log of the *Goeben*, is of interest:

On Aug. 6, 1914, just before sailing from Messina the German commander issued these orders: "News about the enemy is uncertain. I presume his strength lies in the Adriatic and that he is watching both exits to the Messina Strait. Our object is to break through to the east and reach the Dardanelles. I want to create the impression that we intend to go to the Adriatic. In case I so succeed I will veer round in the night and make for Cape Matapan, if possible throwing the enemy off our track."

As the ships—flags flying and music playing—were reaching the open sea the following wireless message from the Kaiser reached the Admiral: "His Majesty expects the *Goeben* and the *Breslau* to succeed in breaking through."

Shortly after leaving the harbour the English cruiser

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Gloucester appeared on the horizon. The English cruiser was emitting signals in three groups. The word "Mumfu" frequently occurred and it was clear that it referred to the *Goeben*. The wireless receivers interpreted the signal of the British cruiser as follows: "*Goeben* making for the Adriatic."

The German wireless officer argued thus: "I can jam him. If I break my waves against his perhaps I can confuse, hold up, destroy his messages. Shall I jam his wireless?" he asked the Admiral.

"Shall we fire?" asked the Commander.

"No," was the answer to both questions. No one apart from the staff understood the Admiral. This is how he argued, however: "This boat is evidently a patrol, intending to wireless our movements to the main British fleet. He shall save us, not ruin us. He shall do his work. We will neither fire at nor jam him. Let him wireless that the Germans are making for the Adriatic, whereas the Dardanelles is our object."

It was dark. The *Breslau* closed in. It was 10 o'clock in the evening; then came the order from the bridge: "Starboard; make for Cape Matapan."

The watching British cruiser saw the manœuvre, but before she could wireless the news that the Germans were making for the east the following order flashed out from the Admiral: "Jam the wireless; jam it like the devil."

For hours the Germans were travelling eastward without obstacle, while the patrol boat tried to make itself understood in vain. Where did the error of our enemy lie? In England the excuse was advanced that the Germans had acquired knowledge of the British secret wireless code and so deceived the latter into waiting. Is it worth while contradicting such stuff? The English

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should have waited before the Strait of Messina, and nowhere else. But so confident were they that the *Goeben* and *Breslau* must try and break through to the Adriatic in order to reach an Austrian port, that they thought it safe to wait in the Strait of Otranto, which is forty sea miles wide. So positive were they on this point that the thought of our making for the Dardanelles never seems to have occurred to them.

When the wireless messages of the *Gloucester* finally reached the British fleet it was too late. The German ships were en route for Constantinople.

That this episode caused the Allies considerable chagrin may well be imagined. The British commander was afterwards relieved. A little later, apparently as an alternative to disarming and being interned, the *Goeben* and *Breslau* were sold by Germany to Turkey, a transaction without precedent and involving a question of international law. Sharp representations were made by the Allies to Turkey, claiming that the latter had violated her neutrality and demanding immediate repatriation of the officers and crews. Turkey failed to comply with this demand and it is reasonable to suppose that the presence of the two warships in Constantinople had considerable influence in persuading the Turkish Government to join Germany and Austria in the war.

At this initial period in near Eastern affairs determined action on the part of the Allies to-

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ward Turkey might possibly have had important effects.

Suppose, for example, that a powerful combined British and French naval force had steamed through the Dardanelles up to Constantinople and demanded the surrender of the *Goeben* and *Breslau* because of Turkey's alleged violation of neutrality laws. Suppose, also, if Turkey had forbidden this passage and refused these demands, that the Allied force had fought its way through the Dardanelles and either captured or destroyed the *Goeben* and *Breslau* in spite of any armed resistance which might have been offered. It is, of course, problematical how much strength Turkey could have shown at this time, but it is not an unreasonable supposition that a resolute naval demonstration in the Dardanelles might have been successful and might have had a decisive influence on the wavering Turks, with consequently far-reaching effects upon the general course of the war.

ATTACKS ON CABLE AND WIRELESS STATIONS

As another example of the kind of naval activity frequently overlooked because unmarked by fighting, the work of destroying the enemy's cable and wireless service and safeguarding one's own, may be mentioned.

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Means of transmitting information are most important factors in modern strategy. These are now so efficient that it is extremely difficult for commerce destroyers of the nation of weaker sea power to escape the net drawn about them by the stronger navies dominating the seas. That the German ships on foreign stations well realised the part wireless and cable would play in their final downfall is evidenced by some interesting attempts made by them to destroy wireless stations and cable stations.

An instance of this was the visit of the *Nürnberg* and a German collier to the British cable station at Fanning Island, situated about four hundred miles south of the Hawaiian group in the mid-Pacific. It was in the morning of September 7, 1914, that the German cruiser rudely intruded upon the usually quiet and uneventful life of Fanning.

The cable employés were hard at work, when they were paralysed to see a German officer at the door of the operating room with a revolver. "Take your hands off those keys, all of you!" he commanded. The men were made to line up against the wall, while the sailors with axes smashed the delicate and costly instruments. Heavy charges of dynamite were planted and the cable was blown to atoms. In the meanwhile the

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collier grappled for the cable further out to sea, with the intention of doing additional damage. A search was then made by the officers, and a number of papers were found which revealed that several valuable instruments were buried in reserve for just such contingencies, and that a quantity of hidden arms and ammunition existed, all of which were quickly uncovered and confiscated.[1]

Later on the *Nürnberg* formed a part of Admiral von Spee's squadron, which after the victory off Coronel attempted to raid the Falkland Islands, just as Fanning had been raided. But this time the British Navy did the surprising, and instead of a defenceless wireless station the Germans found Vice Admiral Sturdee on guard with a battle cruiser division.

Another instance of cable attack, also unhappy in its results for the raiders, occurred in the Far East at the Cocos Islands. The valiant Captain Müller of the *Emden* attempted one of his bogus-funnel ruses as a means of taking by storm the cable and wireless station on Keeling-Cocos Island. But the ruse was detected—and well ahead—by those in charge on shore, who promptly advised by wireless several British men-of-war within call. This led to the *Emden's* ultimate doom. Moreover, a rush cable message was sent out to

[1] Chas. Bright, *19th Century Magazine*, April, 1915.

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the Navy Office at Melbourne, and the alertness and intelligence of the cable and wireless Superintendents showed that they had well learned the lesson taught by the raid on Fanning Island. The *Emden* landing parties did, indeed, succeed in cutting two cables, but were too late. The intelligence which proved fatal had already passed over the wires.

The story of the operator's part in the sinking of the *Emden* is one of those records of ready wit and efficiency which make the best of romance. The guns of the *Sydney* sent the *Emden* on the rocks, but those guns would not have come into play had not the operator at Cocos Island quickly recognised the enemy in all her disguise and dispatched the warning message throughout the world which brought the *Sydney* up in time. It is almost disturbing to think that before the boat's crew had landed from the *Emden* the warships were moving to the rescue and London was making arrangements for repairing the cable and wireless station.

The superior sea power of the Allies, however, made German attempts on Allied wireless and cable stations difficult, and, when successful, of only temporary embarrassment, while the overseas German stations, without ships to defend them, passed permanently into the hands of the Allies.

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CHAPTER IV

Naval Action in Heligoland Bight

THE first noteworthy naval engagement of the war occurred off Heligoland in August, 1914. In connection with this action which at once and so dramatically brought this strategically commanding naval fortress to the world's attention, it is interesting to keep in mind the events that gave to Germany this island outpost and the double base of the Kiel canal.

It was a strange fatality that Great Britain's foreign policy throughout the 19th Century strengthened the sea power of her enemies both off her own shores and at the Dardanelles, while at the same time her contemporary naval policy carefully maintained a navy strong enough to dominate all rivals. This illustrates the necessity in any country for mutual understanding and co-operation between the Foreign Office and the Navy department in shaping foreign policies.

The island of Heligoland had been a British possession from 1807, but in the late eighties was

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ceded to Germany in exchange for concessions in Africa. In times of peace the African explorer Stanley is said to have called this transfer of Heligoland for concessions in Africa, "*The exchange of a trouser button for a whole suit.*" A German interviewer in 1914 reported that the Kaiser, "with joy and pride," spoke of a recent visit to Heligoland, and adapted the above figure to present conditions by saying, "*Today this trouser button holds our whole suit together.*"

Heligoland is situated 35 miles northwest of Cuxhaven and 43 miles north of Wilhelmshaven, and it guards the naval bases and the North Sea entrance of the Kiel canal. As a part of the German program of naval expansion prior to the war it had been converted into an impregnable fortification, and the Bight of Heligoland has become an outwork of the German bases which has greatly increased their tactical value. The Bight forms a channel eighteen miles wide leading to the ports of the Elbe and it is a nest of mines and lurking submarines.

The chief point of interest in the action of August 28, 1914, is the spirited dash against the outskirts of these dangers by Admiral Beatty's squadron, and his escape without serious damage after inflicting losses upon the Germans.

The action of August 28th took place about

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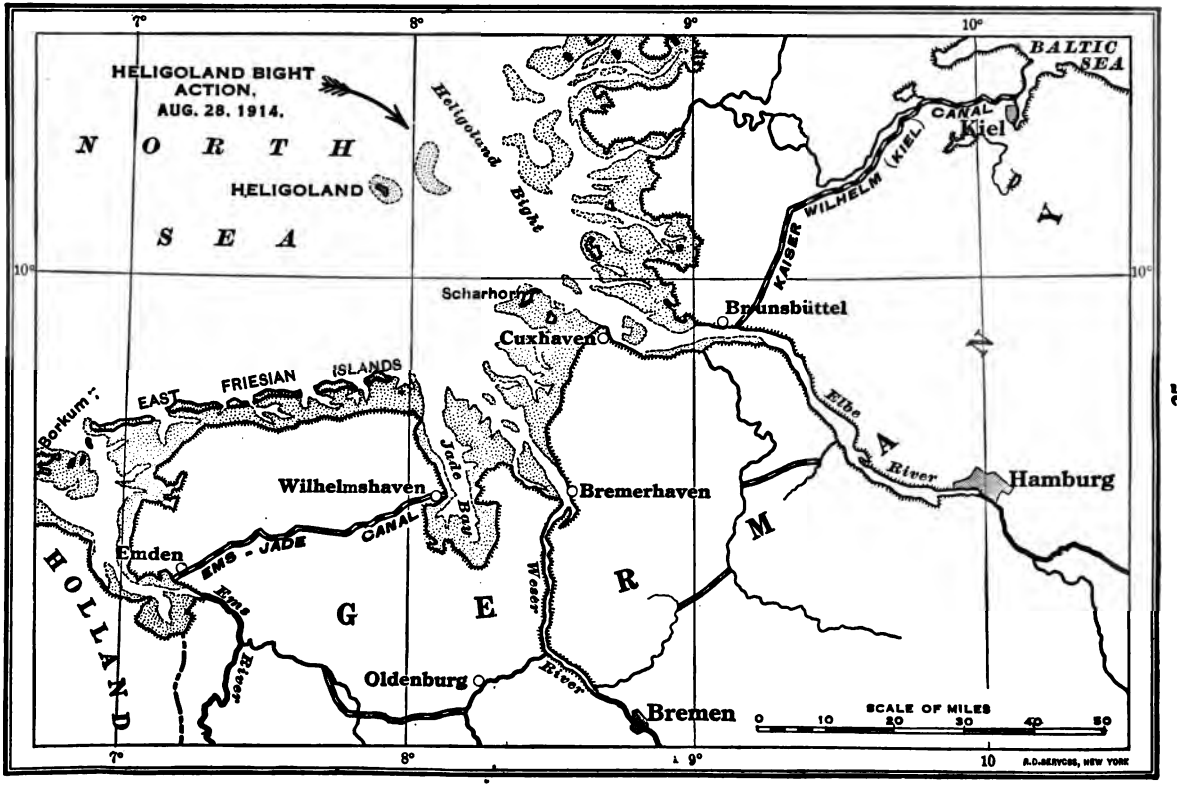

MAP OF GERMAN NORTH SEA COAST

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seven miles north of Heligoland. Reconnoitring British submarines had reported German light cruisers and smaller craft in the vicinity of Heligoland. The British plan was to draw these enemy ships away from the protecting guns of the fortress island and then to destroy them. Detailed official reports have not been published, but various versions appearing in the press indicate a British scheme carried out in some such way as is described in the following paragraphs.

Three submarines were to steam ahead on the surface of the water to act as decoys, and to retreat before the German ships which were expected to give chase. The light cruisers *Arethusa* and *Fearless* were assigned the mission to cut the enemy off from their home bases. A squadron of light cruisers was detailed to support these two ships, while other light cruisers and battle cruisers were held in reserve farther away in the northwest. British destroyers accompanied each of these three cruiser detachments. Vice Admiral Beatty was in chief command of the British forces.

All ships being in their allotted positions at daybreak of the 28th, the three decoy submarines showing their hulls advanced at half speed toward Heligoland. They were accompanied by five sister ships steaming submerged and followed by two destroyers. This detachment was soon

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sighted, and German destroyers gave chase, followed by the light cruisers *Ariadne* and *Strassburg*.

At about 7 a. m. this chase was being conducted toward the British reserve force in the northwest, while the supporting detachment, consisting of the *Arethusa* and the *Fearless* with accompanying destroyers, was steaming toward the eastward to cut off the German retreat. At 8.10 a. m. these two cruisers were engaged by enemy cruisers, and a stubborn action ensued in which the *Arethusa* was damaged. At 8.25 a six-inch projectile from the *Fearless* wrecked the forward bridge of the *Ariadne*, killing her captain, and the German ships then withdrew. At about 9 o'clock the *Fearless* towed the *Arethusa* to the westward, where she was able to make temporary repairs which permitted her to return to the engagement about an hour later.

Meanwhile lively destroyer actions were in progress. The German V-187 boldly attacked a superior number of enemy destroyers, but was overpowered by gun fire and sank with her crew cheering and firing their guns as long as the muzzles were above water.

During a lull in the fighting the British destroyers *Goshawk* and *Defender* lowered boats to rescue survivors of the V-187, but the German

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light cruiser *Mainz* interrupted this operation and forced the destroyers to abandon two of their small boats. The commander of the submerged British submarine E-4 happened to be nearby watching this episode through his periscope. Taking in the situation he manœuvred his submarine for a rescue, and surprised the two small boats by suddenly coming to the surface midway between them. The Britishers and their rescued prisoners were quickly taken aboard, and the E-4 again submerged.

At about 10 o'clock the British destroyers *Lurcher* and *Firedrake*, which were in company with the decoy submarines, reported that they were being chased by two fast enemy cruisers. The *Arethusa*, *Fearless*, and two more light cruisers armed with 4-inch guns went to the rescue and engaged the *Strassburg*, which vessel was soon supported by the *Köln* and *Mainz*. The larger guns carried by the German cruisers proved too strong for the lighter armed British cruisers, and calls for assistance were sent to the reserve force of battle cruisers and light cruisers previously stationed in the northwest.

In the meantime (at 11 a. m.) this reserve force had been attacked by three German submarines. This attack was frustrated by rapid ma-

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nœuvring, and four British destroyers made a counter-attack. Shortly after eleven Vice Admiral Beatty, flying his flag in the battle cruiser *Lion*, received word that the British light cruisers were being hard pressed, and he ordered the *Falmouth*, carrying eight 8-inch guns, and the *Nottingham*, carrying nine 6-inch guns, to go to their support. A little later further calls for assistance were received, and the battle cruisers, having worked up to full speed, proceeded to the scene of the action. When the *Lion* and *Queen Mary* appeared out of the mist their heavy guns quickly decided the battle.

The noonday sun cleared away the mist which had masked the large guns of Heligoland during the engagement, and by evening both British and German forces had retired to their respective home ports. The Germans lost three light cruisers, *Köln*, *Mainz* and *Ariadne*, and one destroyer, *V-187*, sunk. The light cruiser *Strassburg* suffered severe damage as did also other of the German destroyers and small craft. The British lost no ships sunk, but the light cruiser *Arethusa* and some of the destroyers were hard hit and compelled to limp back to home navy yards for extensive repairs before returning again to active service.

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The following is Admiral Beatty's report of the engagement:

H. M. S. Lion, September 1, 1914.

Sir.—I have the honor to report that on Thursday, August 27, at 5 a. m., I proceeded with the First Battle Cruiser Squadron and First Light Cruiser Squadron in company, to rendezvous with the Rear Admiral, *Invincible.*

At 4 a. m., August 28, the movements of the flotillas commenced, as previously arranged, the Battle Cruiser Squadron and Light Cruiser Squadron supporting. The Rear Admiral, *Invincible*, with *New Zealand* and four destroyers, having joined my flag, the squadron passed through the prearranged rendezvous.

At 8.10 a. m. I received a signal from the Commodore (T), informing me that the flotilla was in action with the enemy. This was presumably in the vicinity of their prearranged rendezvous. From this time until 11 a. m. I remained about the vicinity ready to support as necessary, intercepting various signals, which contained no information on which I could act.

At 11 a. m. the squadron was attacked by three submarines. The attack was frustrated by rapid maneuvering, and the four destroyers were ordered to attack them. Shortly after 11 a. m. various signals having been received indicating that the Commodore (T), and Commodore (S) were both in need of assistance, I ordered the Light Cruiser Squadron to support the torpedo flotillas.

Later I received a signal from the Commodore (T), stating that he was being attacked by a large cruiser, and a further signal informing me that he was being hard pressed, and asking for assistance. The Captain (D),

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First Flotilla, also signalled that he was in need of help.

From the foregoing the situation appeared to me critical. The flotillas had advanced only two miles since 8 a. m., and were only about 25 miles from two enemy bases on their flank and rear respectively. Commodore Goodenough had detached two of his light cruisers to assist some destroyers earlier in the day, and these had not yet rejoined. (They rejoined at 2.30 p. m.) As the reports indicated the presence of many enemy ships—one a large cruiser—I considered that his force might not be strong enough to deal with the situation sufficiently rapidly, so at 11.30 a. m. the battle cruisers turned to ESE. and worked up to full speed. It was evident that to be of any value the support must be overwhelming, and carried out at the highest speed possible.

I had not lost sight of the risk of submarines, and possible sortie in force from the enemy's base, especially in view of the mist to the southeast.

Our high speed, however, made submarine attack difficult, and the smoothness of the sea made their detection comparatively easy. I considered that we were powerful enough to deal with any sorties except by a battle squadron, which was unlikely to come out in time, provided our stroke was sufficiently rapid.

At 12.15 p. m. *Fearless* and First Flotilla were sighted retiring west. At the same time the Light Cruiser Squadron was observed to be engaging an enemy ship ahead. They appeared to have her beat.

I then steered NE. to sounds of firing ahead, and at 12.30 p. m. sighted *Arethusa* and Third Flotilla retiring to the westward engaging a cruiser of the *Kolberg* class on our port bow. I steered to cut her off from Heligo-

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land, and at 12.37 p. m. opened fire. At 12.42 the enemy turned to NE., and we chased at 27 knots.

At 12.56 p. m. sighted and engaged a two-funnelled cruiser ahead. *Lion* fired two salvos at her, which took effect, and she disappeared into the mist, burning furiously and in a sinking condition. In view of the mist and that she was steering at high speed at right angles to *Lion*, who was herself steaming at 28 knots, the *Lion's* firing was very creditable.

Our destroyers had reported the presence of floating mines to the eastward, and I considered it inadvisable to pursue her. It was also essential that the squadrons should remain concentrated, and I accordingly ordered a withdrawal. The battle cruisers turned north and circled to port to complete the destruction of the vessel first engaged. She was sighted again at 1.25 p. m. steaming SE., with colors still flying. *Lion* opened fire with two turrets, and at 1.35 p. m., after receiving two salvos, she sank.

The four attached destroyers were sent to pick up survivors, but I deeply regret that they subsequently reported that they searched the area but found none.

At 1.40 p. m. the battle cruisers turned to the northward, and *Queen Mary* was again attacked by a submarine. The attack was avoided by the use of the helm. *Lowestoft* was also unsuccessfully attacked. The battle cruisers covered the retirement until nightfall. By 6 p. m., the retirement having been well executed and all destroyers accounted for, I altered course, spread the light cruisers, and swept northwards in accordance with the Commander-in-Chief's orders. At 7.45 p. m. I detached *Liverpool* to Rosyth with German prisoners, seven

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officers and 79 men, survivors from *Mainz*. No further incident occurred. I have the honor to be, sir, your obedient servant,

(Signed) DAVID BEATTY, *Vice Admiral.*

The Secretary of the Admiralty.

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CHAPTER V

Coronel and Falkland Engagements

BATTLE OFF CORONEL

AT the beginning of the war the British armoured cruisers *Good Hope* and *Monmouth*, together with the light cruiser *Glasgow* and the transport *Otranto*, were in Atlantic waters off the coast of the Americas. These ships rendezvoused off Brazil under the command of Admiral Sir Christopher Cradock and proceeded south around Cape Horn, evidently with the mission to find and destroy German vessels. The old battleship *Canopus* was also under his command, but apparently did not cruise in company with the other ships because of her inferior speed.

At this time German ships in the Pacific included the armoured cruisers *Scharnhorst* and *Gneisenau*, the light cruiser *Nürnberg*, and the light cruiser *Leipzig*. These ships in the Pacific, together with the light cruiser *Dresden*, then in South Atlantic waters, proceeded at the outbreak of the war, apparently in accordance with a prearranged plan, to rendezvous off the coast of South America.

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A comparison of the strategic dispositions of the belligerents in this rather remote theatre of war, in the latter part of October, 1914, shows that the British Admiral had under his command two armoured cruisers, one light cruiser, and one battleship, while the German Admiral, Count von Spee, had two armoured cruisers and three light cruisers, thus giving the British a superiority of about 8,000 tons in displacement and about 2,200 pounds in weight of broadside. These figures, however, are misleading, because they do not truly measure the fighting values of the two groups. The German ships were newer and their squadron more homogeneous in both guns and speed. The British ships were a heterogeneous collection of less modern vessels, with the principal fighting strength in an old battleship of only sixteen knots speed, which did not get into the engagement at all. With the *Canopus* out of the battle line, the Germans had considerable advantage in tonnage and in weight of broadside.[1]

[1] The following figures indicate the strength of the British ships actually engaged. For the strength of the German squadron, see table for Falkland Islands engagement, p. 53

Name	Type	Date	Displacement (Tons)	Belt armour	Guns	Speed
Good Hope....	Armoured Cruiser...	1903	14,100	6-inch	2–9.2", 16–6', 14–3'	24
Monmouth.....	Armoured Cruiser...	1903	9,800	4-inch	14–6', 8–3'	24
Glasgow.....	Light (scout) Cruiser	1911	4,800	none	2–6', 10–4'	26.5

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The information now available seems to afford evidence of superior strategy on the part of Germany. All the more credit is due on account of Germany's marked inferiority in total of sea power, with consequently greater difficulties confronting Admiral von Spee, beset as he was by Japanese squadrons as well as by British squadrons, and without any naval bases in which to seek refuge and comfort.

The movements of these squadrons up to the day of the battle have been considered as strategical because they were in preparation for fighting. We now turn to the tactical phases which have to do with the execution of the fighting.

On the afternoon of November 1, 1914, the British squadron was spread out in scouting formation, steaming along the coast of Chile, looking for enemy ships. The light cruiser *Glasgow* had been dispatched to Coronel to send cables. She left there at 9 a. m., November 1, and while steaming to the northward sighted the German squadron about 4 p. m. At about 5 p. m. the British ships formed in line ahead, the *Good Hope* leading, followed by the *Monmouth*, *Glasgow*, and *Otranto*. The battleship *Canopus* was about 250 miles to the southward. Admiral von Spee formed his ships in line ahead, the *Scharnhorst* leading, followed by the *Gneisenau*, with the

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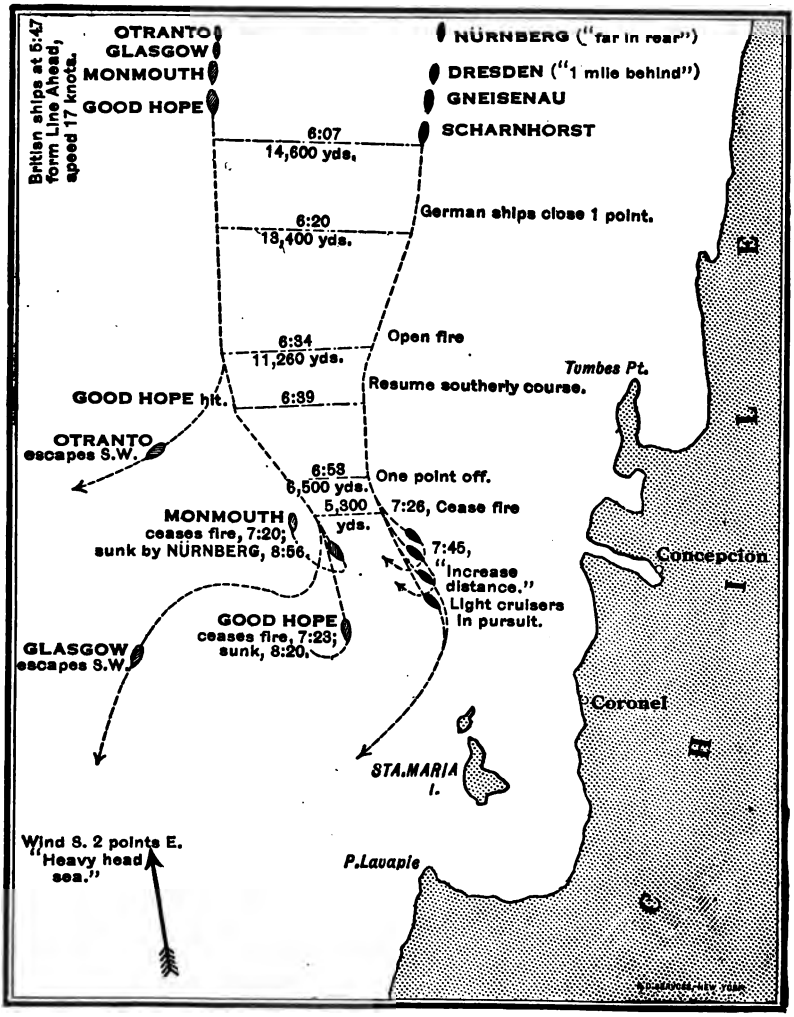

DIAGRAM OF BATTLE OFF CORONEL

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Dresden about one mile in the rear and the *Nürnberg* far behind. At 6.07 p. m. the two squadrons were on nearly parallel southerly courses, about 15,000 yards apart, with the German line inshore.

There was a heavy sea and strong wind from one to two points to the eastward of south, and the German ships were able to make their course a little to the westward of south, bringing this heavy sea on their unengaged bow. On the other hand, the British carried wind and sea a little on the engaged bow, a marked disadvantage, making their six-inch guns, especially the lower tier, practically useless. It is to be noted that the German 8.2-inch guns were mounted higher and were better for fighting in a seaway. Practically all that the British had to oppose the twelve 8.2-inch guns of the Germans were two old 9.2-inch turret guns on board the *Good Hope*. An additional disadvantage was that the British ships were outlined against the western sky, supplying an excellent point of aim for the Germans.

At this time Admiral Cradock was no doubt doing some hard thinking. Should he engage with such big odds against him? There was the *Canopus*, his main fighting strength, 250 miles to the southward. By bearing off sharply to the westward, even at this late hour, the speeds of the

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two squadrons were so nearly equal that he could have avoided engaging that night, and by morning he might have joined the *Canopus* and fought the battle on a more equal footing. It would be interesting to know what thoughts flashed through the Admiral's mind and what counsels prevailed upon him to make the courageous but fateful decision embodied in his signal to the *Canopus* at 6.18 p. m., "I am going to attack the enemy now."

The two squadrons gradually neared one another on converging courses, and Vice Admiral von Spee describes the resulting battle as follows:

Wind and swell were head on and the vessels had heavy going, especially the small cruisers on both sides. Observation and distance estimation were under a severe handicap because of the seas which washed over the bridges. The swell was so great that it obscured the aim of the gunners at the six-inch guns on the middle deck, who could not see the sterns of the enemy ships at all and the bows but seldom. At 6.20 p. m., at a distance of 13,400 yards, I turned one point toward the enemy, and at 6.34 opened fire at a distance of 11,260 yards. The guns of both our armoured cruisers were effective, and by 6.39 already we could note the first hit on the *Good Hope*. I at once resumed a parallel course instead of bearing slightly toward the enemy.

The English opened their fire at this time. I assume that the heavy sea made more trouble for them than it

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did for us. Their two armoured cruisers remained covered by our fire, while they, so far as could be determined, hit the *Scharnhorst* but twice and the *Gneisenau* only four times.

At 6.53, when 6,500 yards apart, I ordered a course one point away from the enemy. They were firing more slowly at this time, while we were able to count numerous hits. We could see, among other things, that the top of the *Monmouth's* forward turret had been shot away and that a violent fire was burning in the turret. The *Scharnhorst*, it is thought, hit the *Good Hope* about thirty-five times.

In spite of our altered course the English changed theirs sufficiently so that the distance between us shrunk to 5,300 yards. There was reason to suspect that the enemy despaired of using his artillery effectively and was manœuvring for a torpedo attack. The position of the moon, which had risen at 6 o'clock, was favourable to this move. Accordingly I gradually opened up further distances between the squadrons by another deflection of the leading ship at 7.45. In the meantime it had grown dark. The range finders on the *Scharnhorst* used the fire on the *Monmouth* as a guide for a time, though eventually all range finding, aiming, and observations became so inexact that firing was stopped at 7.26.

At 7.23 a column of fire from an explosion was noticed between the stacks of the *Good Hope*. The *Monmouth* apparently stopped firing at 7.20. The small cruisers, including the *Nürnberg*, received by wireless at 7.30 the order to follow the enemy and to attack his ships with torpedoes. Vision was somewhat obscured at

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this time by a rain squall. The light cruisers were not able to find the *Good Hope*, but the *Nürnberg* encountered the *Monmouth*, and at 8.58 was able by shots at closest range to capsize her without a single shot being fired in return. Rescue work in the heavy sea was not to be thought of, especially as the *Nürnberg* immediately afterward believed she had sighted the smoke of another ship and had to prepare for a new attack.

The small cruisers had neither losses nor damage in the battle. On the *Gneisenau* there were two men slightly wounded. The crews of the ships went into the fight with enthusiasm, every one did his duty and played his part in the victory.

In concluding the account of this battle it is difficult to find any fault in the tactics used by Vice Admiral von Spee. He appears to have manœuvred so as to secure the advantage of light, wind, and sea. He also suited himself as regards the range. The *Good Hope* and *Monmouth* were destroyed, the *Glasgow* had a narrow and lucky escape, while the German losses were two slightly wounded.

FALKLAND ISLANDS ENGAGEMENT

After the battle off Coronel, while the German squadron coaled at Valparaiso and made its way in no great hurry around Cape Horn, the British were not idle. Within ten days of the receipt of

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the news of the British disaster in the South Pacific the dreadnought battle cruisers *Invincible* and *Inflexible*, under command of Vice Admiral Sturdee, were on their way to the Falkland Islands, a wireless and coaling station off the southeast coast of South America. It would appear that Admiral von Spee contemplated an attack on the Falklands, and it would also appear that he did not anticipate the vigorous and alert strategy of his enemy. Had he done so he surely would have either tried to time his visit earlier or else have abandoned it entirely.

As a matter of ordinary precaution it seems strange that he did not send a scout ship ahead to reconnoitre. At least he might have planned to arrive in the late afternoon, which would have given his ships a good chance to escape from a superior force under cover of darkness. On the other hand, little criticism can be made of England's strategy. On the morning of December 8, when the German squadron hove in sight of the lookout ship off the Falkland harbour entrance, an opposing fighting force had been provided, and lay at anchor within, consisting of two battle cruisers, the *Invincible* and *Inflexible;* three armoured cruisers, the *Carnarvon*, *Cornwall*, and *Kent;* the light cruisers *Bristol* and *Glasgow;* and the predreadnought battleship *Canopus*.

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The German squadron was the same as off Coronel—two armoured cruisers, the *Scharnhorst* and *Gneisenau*, and three light cruisers, the *Leipzig*, *Nürnberg*, and *Dresden*.

The total tonnage of the British ships was 87,000—nearly three times that of the German tonnage, 35,500. The total weight of the British broadside was 9,566 kilograms, nearly five times that of the German broadside, which was 2,032 kilograms.

The following table gives the details of the opposing squadrons:

BRITISH SQUADRON

Name	Type	Date	Displacement (Tons)	Belt armour	Guns	Speed
Invincible	Battle Cruiser	1908	17,250	7-inch	8–12", 16–4"	26.5
Inflexible	Battle Cruiser	1908	17,250	7-inch	8–12", 16–4"	26.5
Carnarvon	Armoured Cruiser	1904	10,850	6-inch	4–7.5", 6–6"	23.0
Cornwall	Armoured Cruiser	1901	9,800	4-inch	14–6"	23.5
Kent	Armoured Cruiser	1903	9,800	4-inch	14–6"	23.0
Bristol	Scout Cruiser	1911	4,800	none	2–6", 10–4"	26.5
Glasgow	Scout Cruiser	1911	4,800	none	2–6", 10–4"	26.5
Canopus	Coast Defense Ship	1897	12,950	6-inch	4–35 cal. 12", 12–6"	16.5

GERMAN SQUADRON

Scharnhorst	Armoured Cruiser	1907	11,600	6-inch	8–8.2", 6–6"	23.5
Gneisenau	Armoured Cruiser	1907	11,600	6-inch	8–8.2", 6–6"	23.5
Leipsig	Protected Cruiser	1906	3,250	none	10–4"	23.0
Nurnberg	Scout Cruiser	1908	3,450	none	10–4"	24.0
Dresden	Scout Cruiser	1908	3,600	none	10–4"	24.0

In addition to the fighting ships just mentioned, the converted cruiser *Macedonia* was acting as a

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lookout ship for the British, and the steamships *Baden* and *Santa Isabel* were in the train of the German squadron. The British ships had arrived at 10.30 a. m. the day before and had begun coaling at once. At the time of the engagement the battle cruisers, though not filled up, had sufficient fuel on board, and the fact that they were a little light in draft favoured their speed.

At 8 a. m. the German ships were sighted, and orders were given to raise steam for full speed. The high land hid the main British force, and at 9.20 the *Gneisenau* and the *Nürnberg*, with guns trained on the wireless station, had closed to within 11,000 yards of the *Canopus*, which latter vessel opened fire at them across the low land with her twelve-inch guns. The Germans hoisted their colours and turned away from their hidden foe, but a few minutes later turned to port, as though to close on the *Kent*, at the entrance of the harbour. Then the British battle cruisers were sighted, and the two German ships altered course and increased their speed to join their consorts.

At 9.45 a. m. the British squadron got under way and headed for the German ships, which were clearly in sight, hull down. The sea was calm, with a light breeze from the northwest. The visibility was at a maximum, under a bright sun in a clear sky. At 10.20 signal for a general chase

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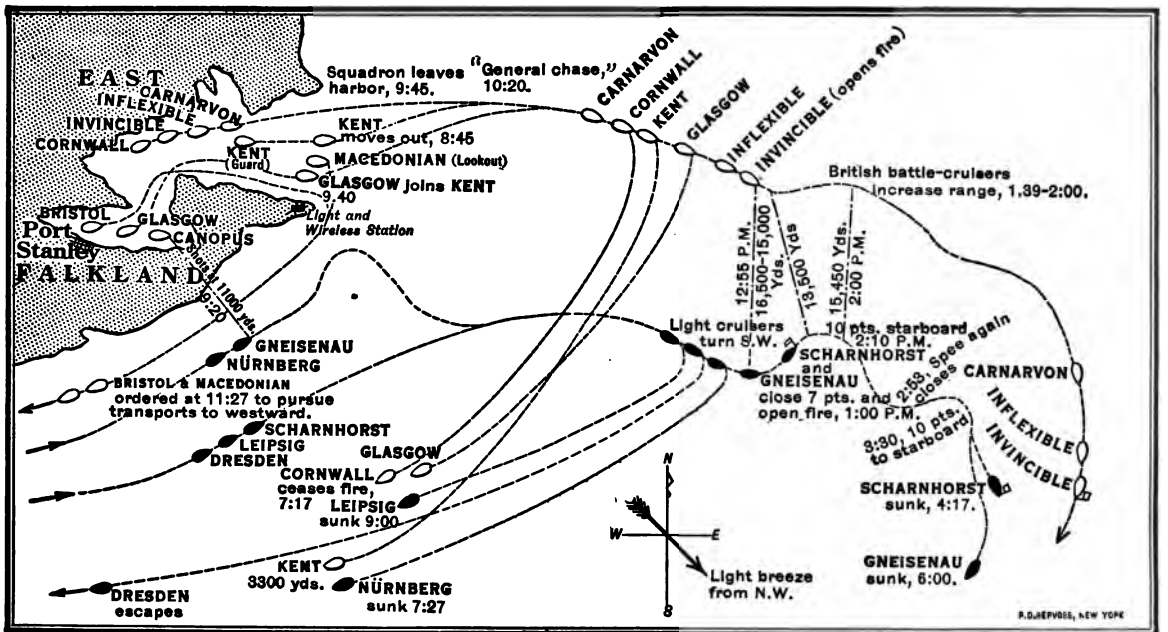

DIAGRAM OF FALKLAND ISLANDS ENGAGEMENT

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was made, but the battle cruisers eased speed to twenty knots, to allow the other cruisers to get in station.

Three enemy ships, probably transports or colliers, were sighted off Port Pleasant, and the *Bristol* was ordered to take the *Macedonia* in company and destroy the transports.

The British squadron, as a whole, was not able to close on the German squadron, and at 11.20 Vice Admiral Sturdee decided to attack with his faster ships, the *Invincible*, *Inflexible*, and *Glasgow*. These three all had a speed of twenty-six and one-half knots, and were able to close quickly on the *Scharnhorst* and *Gneisenau*, which had a speed of only twenty-three and one-half knots. At 12.55 the battle cruisers opened fire on the German light cruiser *Leipzig* at a range of 16,500 to 15,000 yards. Soon after opening fire, the German light cruisers turned to the southwest and spread, in an effort to escape. The armoured cruisers *Cornwall* and *Kent* and the light cruiser *Glasgow* gave chase, while the battle cruisers and the *Carnarvon* kept on after the *Scharnhorst* and *Gneisenau*. Admiral Sturdee maintained, for the most part, a range of between 16,000 and 12,000 yards, destroying the enemy with his twelve-inch guns in rather leisurely fashion, without getting within the effective range of the German 8.2-inch

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guns. At 4.17 p. m. the *Scharnhorst* sank, with her flag flying. The *Gneisenau* kept up the unequal fight, but at 6 p. m. she also sank with her flag flying.

In the chase after the light cruisers the *Glasgow* was the only ship with superior speed, but she was able to engage the *Nürnberg* and *Leipzig*, delaying them enough to give the *Cornwall* and *Kent* a chance to get into action. The *Leipzig* sank at 9 p. m. and the *Nürnberg* was sunk by the *Kent* at 7.27 p. m.

The *Dresden* escaped, and made a precarious commerce destroying cruise, which lasted until March 14, 1915, when she was discovered near Juan Fernandez island and destroyed by the *Kent*, *Glasgow*, and auxiliary cruiser *Orama*.

Hindsight is always better than foresight, and we should be slow to criticise without knowing full particulars, but one cannot help wondering at the tactical disposition of the *Bristol* and questioning if the *Dresden* would have escaped had the *Bristol* been on hand to help the *Glasgow*. It is to be noted that the *Bristol*, a sister ship to the *Glasgow*, was faster and better armed than any of the German light cruisers, and was also three and one-half knots faster than the British armoured cruisers *Carnarvon*, *Cornwall* and *Kent*. The reasons for sending a twenty-six-and-one-

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half-knot ship instead of a twenty-three-knot ship after the transports are not very clear, especially as the *Bristol* and the *Glasgow* were the only two ships besides the battle cruisers fast enough to catch the *Nürnberg* and the *Dresden*. The *Bristol*, to be sure, accomplished her assigned mission in destroying the German steamships. But could not the three-knot slower armoured cruiser *Carnarvon* have done this equally well? As it was, the *Carnarvon* served no useful purpose, and no avail was made of the valuable speed asset of the *Bristol*.

The British lost nine killed and about the same number wounded. All the German ships except the *Dresden* were sunk, and only about 200 men were saved from the total complements. This decisive naval action gave the Allies practically undisputed control of the high seas.

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CHAPTER VI

Dardanelles Operations

TURKEY entered the war on October 31, 1914, and four days later the outer forts of the Dardanelles were bombarded for about ten minutes by Allied men-of-war. What useful purpose this bombardment served the Allied cause is not clear. There seems to have been no intention of pushing the attack home, and simply as a diversion it would appear calculated to put the enemy on guard without gaining any commensurate military advantage.

As early as November 25, 1914, the idea of making a serious attack on the Dardanelles was discussed at a meeting of the British War Council. In addition to political benefits expected to result from a military success in this war theatre and the obvious value of opening a way to Russia's Black Sea ports, the argument was advanced that the best way to protect India and Egypt was to threaten Turkish communications, or better yet to cut them by capturing Constantinople. The

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Council admitted the points in favour of the project, but because of the critical situation on the Western front and the shortage of tonnage for transport service the question for the time being was dismissed.

On January 2, 1915, a telegram from Petrograd stating that Russia was hard pressed in the Caucasus and expressing the hope that a demonstration would be made against the Turks from some other quarter, spurred the British War Council to a reconsideration of the Dardanelles project. In the ensuing deliberations the need of Russia seems to have introduced a question of expediency which hampered the development of plans strictly in accord with sound military principles.

At this time naval and military opinion seems to have agreed that if a serious attack was to be made against the Dardanelles fortifications it was highly desirable to make it a joint naval and military operation.

The original estimate of the British War Office was that an army of 150,000 men would be required for a combined naval and military attack. The difficulty of supplying this force and the urgency of doing something for Russia led to a discussion of the advisability of making a purely naval demonstration with a view either to with-

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drawing if the opening bombardment were not successful, or continuing the attack with such military support as could be provided on the spot, if the results of the preliminary demonstration warranted further operations aiming at the ultimate capture of Constantinople.

In these discussions a strong opinion developed that the Dardanelles might be forced by the fleet alone, and in consequence, while the War Office made certain military preparations in the Eastern war theatre, important transactions took place between the Admiralty office and Vice Admiral Carden, then commanding the British forces in the Mediterranean.

On January 3, 1915, the following telegram was dispatched from the Admiralty to Vice Admiral Carden:—

"Do you think that it is a practical operation to force the Dardanelles by the use of ships alone? It is assumed that older battleships would be employed, that they would be furnished with mine sweepers, and that they would be preceded by colliers or other merchant vessels as sweepers and bumpers. The importance of the result would justify severe loss. Let us know what your views are."

On January 5th, Vice Admiral Carden replied to the Admiralty telegram of the third, in the following terms:—

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"I do not think that the Dardanelles can be rushed, but they might be forced by extended operations with a large number of ships."

On January 6th, the telegram following was sent from the First Lord to Vice Admiral Carden:—

"High authorities here concur in your opinion. Forward detailed particulars showing what force would be required for extended operations. How do you think it should be employed, and what results could be gained?"

On January 11th, Vice Admiral Carden replied to the telegram sent to him from the Admiralty on the 6th. Four operations he said were possible. These were:—

(a) The destruction of the defences at the entrance to the Dardanelles.

(b) Action inside the straits, so as to clear the defences up to and including Cephez Point Battery N8.

(c) Destruction of defences of the narrows.

(d) Sweeping of a clear channel through the mine field and advance through the narrows, followed by a reduction of the forts further up, and advance into the Sea of Marmora.

He estimated that it would take a month to carry out all these operations.

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At a meeting of the war council on January 13, 1915, a decision was made and this decision as noted by Premier Asquith reads:—

"The Admiralty should prepare for a naval expedition in February to bombard and take the Gallipoli peninsula, with Constantinople as its objective."

On January 15th, the Chief of the Naval War Staff reported his opinion on Admiral Carden's proposal. His memorandum began with the following remark: "Concur generally in his plans." After dealing at some length with the detailed proposals this memorandum concluded by saying: "I would suggest (a) might be approved at once, as the experience gained would be useful." Unless the experience gained from (a) and (b) justified it, the undertaking of (c) and (d) was not recommended.

On February 16th, a very important informal meeting of ministers was held. Owing to events in Egypt and to changes in plans in the West, it was decided to mass a considerable military force in the Mediterranean to be used as occasion might require. The decisions, which were eventually incorporated with those of the war council, were as follows:—

"1. The 29th division, hitherto intended to form part of Sir John French's army, to be des-

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patched to Lemnos at the earliest possible date. It is hoped it may be able to sail within nine or ten days.

"2. Arrangements to be made for a force to be dispatched from Egypt, if required.

"3. The whole of the above forces, in conjunction with the battalions of Royal Marines already despatched, to be available in case of necessity to support the naval attack on the Dardanelles.

"4. Horse boats to be taken out with the 29th division, and the Admiralty to make arrangements to collect small craft, tugs, and lighters in the Levant.

"5. The Admiralty to build special transports and lighters suitable for the conveyance and landing of a force of 50,000 men at any point where they may be required."

It had been intended that the 29th division should be ready to sail for the Mediterranean by the 22nd of February, but on the 20th the War Office decided that the general situation was such that this division could not be despatched as planned. On March 10th the situation on other fronts had changed and the War Office announced that the decision to send the 29th division was again operative. This change of mind entailed a delay of three weeks in despatching these troops.

In the meantime during January and February

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MAP OF DARDANELLES, SEA OF MARMORA AND BOSPORUS. THE APPROACHES TO CONSTANTINOPLE

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British and French forces in the Mediterranean were preparing for extensive operations against the Dardanelles. The island of Tenedos was seized. Under an agreement with Venizelos, the Greek Premier, the island of Lemnos was occupied, and Mudros with its large harbour converted into an advanced naval and military base. Lemnos was less than fifty miles from Gallipoli, while Tenedos was only twenty-two miles distant from the Turkish coast. It has been said that there was also an arrangement with Venizelos to supply a Greek military expeditionary force, but, as the event proved, this aid could not be relied on.

By the middle of February a large British fleet had been assembled, including the new superdreadnought *Queen Elizabeth*, carrying 15-inch guns, the battle cruiser *Inflexible*, the predreadnought battleships *Agamemnon*, *Irresistible*, *Vengeance*, *Triumph*, *Albion*, *Lord Nelson*, *Ocean*, *Majestic*, and a number of light cruisers, destroyers, submarines, mine sweepers, and other small craft. In addition to these the French contributed a fleet including the predreadnought battleships *Charlemagne*, *Gaulois*, *Suffren*, and *Bouvet*, with attending destroyers and submarines.

Naval operations began on the morning of February 19, 1915, at 8.00 a. m., when the combined fleet, with Vice Admiral Carden in supreme com-

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mand and Rear Admiral Guepratte in command of the French division, arrived off Gallipoli, and began a long range bombardment of the outer forts. In the middle of the afternoon three British and three French battleships closed the forts and by darkness apparently all the outer shore batteries had been silenced.

The demolition, however, did not prove permanent and bad weather prevented further operations until February 25th, when another bombardment took place and by 5 o'clock in the afternoon the forts had again been silenced.

Mine sweepers then cleared the way for the larger ships and on the next day a division of battleships steamed four miles up the straits and bombarded Fort Dardanos, a battery mounting 5.9-inch guns. This fort together with a number of concealed batteries was silenced and marines were then landed to complete the demolition. This work was successfully accomplished, except at Kum Kale, where a strong force of Turks drove the landing party back to their boats.

Bad weather again intervened, permitting the Turks to rehabilitate Fort Dardanos and the hidden shore batteries. On March 1st the operations were resumed and mine sweepers cleared the channel to within one and one-half miles of the Narrows. During the next four days the bombard-

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ment and demolition by landing parties went on. A French squadron bombarded the Turkish line of communications at Bulair, with the hope of embarrassing the enemy's food and munition supply, but without success. Also, as a diversion, a combined Allied fleet bombarded Smyrna, but this does not appear to have had much military significance.

On March 6th and 7th violent naval attacks were made both by battleships well within the straits at close range and by the *Queen Elizabeth*, *Agamemnon* and *Ocean* at long range from the Gulf of Saros. The indirect fire of these battleships was controlled by airmen, who watched the fall of shell striking beyond the heights of the Peninsula and signalled spot corrections to the ships. As the angle of fall was such that the European forts could not be reached, the indirect fire was concentrated on the forts near Chanak on the Asiatic side. It was thought that this bombardment caused the Turks much discomfiture, and that the 15-inch shrapnel from the *Queen Elizabeth* inflicted heavy losses. But the forts were not permanently silenced and although the heavy shrapnel fire was temporarily effective against enemy personnel there was not a sufficient number of high explosive shells dropped in the fortifica-

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tions to damage them beyond repair. The result of these bombardments appears to have been exaggerated both in the minds of the naval commanders on the spot and in the hopes of the Allied people at large.

From March 7th to March 18th, there was a lull in the operations at the straits. It was realised that there would be need to land troops, and by March 15th the British forces gathered at Mudros together with the French force assembled at Bizerta totalled somewhat over 100,000 fighting men, while the naval forces had been increased to the strength indicated in the following table.[1]

ALLIED FLEET AT DARDANELLES

BRITISH BATTLESHIPS

Name	Guns	Weight in Pounds of a Broadside Salvo: Heavy Guns	Weight in Pounds of a Broadside Salvo: Secondary Guns
Queen Elizabeth	Eight 15-inch, twelve 6-inch	15,600	600
Inflexible	Eight 12-inch, sixteen 4-in.	6,800	372
Lord Nelson	Four 12-inch, ten 9.2-inch	5,300	...
Agamemnon	" " " "	5,300	...
Swiftsure	" 10-inch, fourteen 7.5-inch	3,312	...
Triumph	Four 10-inch, fourteen 7.5-inch	3,312	...
Cornwallis	Four 12-inch, twelve 6-inch	3,400	600
Queen	" " " "	3,400	600
Implacable	" " " "	3,400	600
London	" " " "	3,400	600
Irresistible	" " " "	3,400	600

[1] *Naval Inst. Proc.*, pp. 1735 and 1736, 1915.

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Name	Guns	Weight in Pounds of Broadside Salvo: Heavy Guns	Secondary Guns
Goliath	Four 12-inch, twelve 6-inch.	3,400	600
Ocean	" " " "	3,400	600
Vengeance	" " " "	3,400	600
Albion	" " " "	3,400	600
Canopus	" " " "	3,400	600
Prince George	" " " "	3,400	600
Majestic	" " " "	3,400	600
BRITISH CRUISERS, ETC.			
Euryalus	Two 9.2-inch, twelve 6-inch	..	1,360
Dublin	Eight 6-inch	..	500
Minerva	Eleven 6-inch	..	600
Doris	" "	..	600
Talbot	" "	..	600
Phaeton	Two 6-inch, eight 4-inch	..	355
Amethyst	Twelve 4-inch	..	217
Sapphire	" "	..	217
Hussar	Two 4.7-inch, four 6-pounders	..	102
BRITISH MONITOR			
Humber	Two 6-inch, two 4.7-inch	..	290
BRITISH DESTROYERS			
Scorpion	One 4-inch, three 12-pounders	..	...
Wolverine	One 4-inch, three 12-pounders	..	...
Pincher	One 4-inch, three 12-pounders	..	...
Renard	One 4-inch, three 12-pounders	..	...
Chelmer	Four 12-pounders	..	...
FRENCH BATTLESHIPS			
Suffren	Four 12-inch, ten 6.4-inch	3,880	495
Gaulois	" " " 5.5-inch	3,880	330
Charlemagne	" " " "	3,880	330
St. Louis	" " " "	3,880	330
Bouvet	Two 12-inch, two 10.8 inch, eight 5.5-inch	2,060	308
Henri IV	Two 10.8-inch, seven 5.5-inch	1,124	264
Jauréguiberry	Two 12-inch, two 10.8-inch, eight 5.5-inch	2,416	264

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Name	Guns	Weight in Pounds of a Broadside Salvo: Heavy Guns	Weight in Pounds of a Broadside Salvo: Secondary Guns
	FRENCH CRUISERS		
Kléber	Eight 6.5-inch, four 3.9-inch	..	754
Jeanne d'Arc	Two 7.6-inch, fourteen 5.5-inch	..	763
D'Entrecasteaux	Two 9.4-inch, twelve 5.5-inch	..	1,146
	RUSSIAN CRUISER		
Askold	Twelve 6-inch	..	623

Soon after this concentration unforeseen difficulties intervened, and the plan for early joint operations did not materialise. Early in March it had been decided to send out Sir Ian Hamilton to command the troops being assembled near the Dardanelles. His instructions contained the following passage:—

"The fleet has undertaken to force the passage of the Dardanelles. The employment of military forces on any large scale at this juncture is only contemplated in the event of the fleet failing to get through after every effort has been exhausted. Having entered on the project of forcing the Straits, there can be no idea of abandoning the scheme."

At this time, in March, important telegrams passed between the Admiralty and Admiral Carden. The First Lord, Mr. Winston Churchill, on March 11th, asked whether the time had not arrived when "You will have to press hard for a

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decision," adding:—"Every well-conceived action for forcing a decision, even should regrettable losses be entailed, will receive our support."

In his reply Admiral Carden said:—

"I consider stage when vigorous action is necessary for success has now been reached. I am of opinion that in order to insure my communication line immediately Fleet enters the Sea of Marmora, military operations on a large scale should be opened at once."

On March 15th the First Lord of the Admiralty sent another telegram to Admiral Carden, in which he said:—

"When General Hamilton arrives on Tuesday night concert with him in any military operation on a large scale which you consider necessary. . . . The 29th division (18,000 additional men) cannot arrive until April 2nd."

On March 16th, Admiral Carden was forced to resign his command for reasons wholly based on the state of his health. He was succeeded by Vice Admiral de Robeck. On March 17th Sir Ian Hamilton arrived at Lemnos to take chief command of the Allied armies. A conference at once took place, attended by Vice Admiral de Robeck, Rear Admiral Guepratte commanding the French naval forces, General d'Amade command-

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ing the French land forces, and Sir Ian Hamilton.

At about this time it was discovered that the transports had been improperly loaded; guns and munitions needed at once on landing were inaccessible, being buried under tents and other supplies. Sir Ian Hamilton strongly demurred against launching a land attack immediately and made the point that in order to assure an effective landing practically the entire transport fleet must return to Egypt and be reloaded.

The decision of the conference hung on two alternatives—whether to make a combined attack at once under the handicap of improperly loaded transports, or to delay the land attack until the difficulty could be corrected with the penalty of losing valuable time. The latter course was decided upon and many hold that it was the fatal error of the campaign. It gave the Turks time to organise their defence.

Enver Pasha the Turkish leader is reported to have declared at a later date:—"Their delay enabled us thoroughly to fortify the peninsula, and in six weeks' time we had taken down there over two hundred Austrian Skoda guns."

The decision to delay the landing of troops did not deter Vice Admiral de Robeck from carrying out the naval attack. On March 17th the Allied

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fleet sailed from Mudros, arriving off the straits at daylight on the 18th.

The serious losses to the Allies during the bombardment of this date are told in an official statement from the British and French Admiralties from which the following extracts are taken:

Mine-sweeping having been in progress inside the straits, a general attack was delivered by the British and French fleets March 18 on the fortresses at the narrows. At 10.45 a. m. the *Queen Elizabeth*, *Inflexible*, *Agamemnon* and *Lord Nelson* bombarded forts, while the *Triumph* and the *Prince George* fired at batteries. A heavy fire was opened on the ships. At 12.22 p. m. the French squadron, consisting of the *Suffren*, *Gaulois*, *Charlemagne* and *Bouvet*, advanced up the Dardanelles and engaged the forts at closer range, and the forts replied strongly. Their fire was silenced by the 10 battleships inside the straits, all the ships being hit several times during this part of the action. By 1.25 p. m. all the forts had ceased firing. The *Vengeance*, *Irresistible*, *Albion*, *Ocean*, *Swiftsure* and *Majestic*, then advanced to relieve the six old battleships inside the straits. As the French squadron, which had engaged the forts in a most brilliant fashion, was passing out, the *Bouvet* was blown up by a drifting mine. She sank in 36 fathoms in less than three minutes. At 2.36 p. m. the relief battleships renewed the attack on the forts, which again opened fire. The attack on the forts was maintained, while the operations of the mine sweepers continued.

At 4.09 p. m. the *Irresistible* quit the line, listing heavily, and at 5.50 p. m. sank, having probably struck

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a drifting mine. At 6.05 p. m. the *Ocean*, having also struck a mine, sank. Both vessels sank in deep water, practically the whole of their crews having been removed safely under a hot fire. The *Gaulois* was damaged by gun fire. The *Inflexible* had her forward control position hit by a heavy shell and required repair. The bombardment and the mine sweeping operations terminated when darkness fell. The losses of the ships were caused by mines drifting with the current, which were encountered in areas hitherto swept clear, and this danger will require special treatment.

The British casualties among personnel were not heavy, considering the scale of the operations, but practically the whole of the crew of the *Bouvet* was lost with the ship, an internal explosion apparently having supervened on the explosion of the mine.

Vice Admiral de Robeck said, in part: "The power of the fleet to dominate the fortresses by superiority of fire seems to be established. Various other dangers and difficulties will have to be encountered, but nothing has happened which justifies the belief that the cost of the undertaking will exceed what always has been expected and provided for. The British casualties in the personnel are 61 men killed, wounded and missing. I desire to bring to the notice of Your Lordships the splendid behaviour of the French squadron. Their heavy loss leaves them quite undaunted. They were led into close action by Rear Admiral Gueprette with greatest gallantry."

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On March 19th Admiral de Robeck telegraphed the Admiralty that having had a satisfactory interview with Sir Ian Hamilton, General d'Amade and Admiral Wemyss, he proposed to proceed with the attack on the following day. It is significant that a meeting of the War Council in London was held on the same day of this despatch, March 19th, at which it was decided "to inform Vice Admiral de Robeck that he could continue the naval operations against the Dardanelles if he thought fit." The attitude of Sir Ian Hamilton and the menace of mines and torpedoes, however, influenced Admiral de Robeck to change his mind and discontinue naval operations.

Sir Ian Hamilton had witnessed the naval attack of March 18th and telegraphed the War Office on the 19th: "I have not yet received any report on the naval action, but from what I actually saw of the extraordinarily gallant attempt made yesterday I am being most reluctantly driven towards the conclusion that the Dardanelles are less likely to be forced by battleships than at one time seemed probable, and that if the Army is to participate its operations will not assume the subsidiary form anticipated. The Army's share will not be a case of landing parties for the destruction of forts, etc., but rather a case of a deliberate and progressive military operation carried out in

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force in order to make good the passage of the Navy."

On March 23rd another telegram from Sir Ian Hamilton said:—"I have now conferred with Admiral de Robeck and we are equally convinced that to enable the fleet effectively to force the passage of the Dardanelles the co-operation of the whole military force will be necessary." On the same day Admiral de Robeck telegraphed the Admiralty that the mine menace was proving greater than he had expected; that time was required to make arrangements to meet this menace; that a decisive operation about the middle of the next month appeared better than to take great risks for accomplishing what might well prove to be only half measures; and that it did not appear practicable to land a sufficient force inside the Dardanelles to carry out the service. On the 26th he added:—"The check on the 18th is not, in my opinion, decisive, but on the 22nd of March I met General Hamilton and heard his views, and I now think that, to obtain important results and to achieve the object of the campaign, a combined operation will be essential."

From this time onward two points became perfectly clear. One was that the Government had no intention of abandoning the attack on the Dardanelles; the second was that the attack would

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be made both by the Navy and by Military forces employed on a large scale. Sir Ian Hamilton withdrew to Egypt to reload the transports and perfect preparations for landing in force, while the combined fleets made the necessary arrangements to do their share when the time came for making the grand effort.

About six weeks later (April 25th to 26th) took place the famous combined land and sea attack, in which the Allied troops attained at a great cost a slight footing on the peninsula. The guns of the fleet afforded a covering fire for the troops, but there was no serious bombardment of the point of landing. The Turks evidently had made the most of the six weeks' delay and were well prepared.

From the time of this landing it may truthfully be said that the naval force was used only as an auxiliary of the land forces, although the Navy performed arduous duties in the campaign which followed. On land, in spite of desperate fighting, the Allies made no great headway. There was another landing in August, which was almost as costly as the first—again without tactical results—and the undertaking was abandoned in January, 1916.

In this campaign the Allies lost five British predreadnoughts, one French predreadnought and

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about 115,000 men killed, wounded or missing, with about 10,000 more sick. The cost of the expedition, ship losses not included, was about $1,000,000,000. As a diversion to hold an enemy force away from other fields it succeeded; but in the attainment of its main objective it was a failure.

The decision to attempt forcing the Dardanelles has been much criticised, and it appears indeed to have been a formidable undertaking. But whether or not it was unwise to attempt it is a debatable question. A successful attack upon the Dardanelles might well have become of the very first importance and produced results which would have quickly been felt in the main eastern and western theatres of the war. Consider for a moment the position of Russia at that time: a vast empire, with millions of men mobilised, crammed with surplus stores of wheat, yet for all practical purposes more cut off from the rest of the world than Germany. The White Sea was ice-bound, and Archangel, which is indifferently served by its railway, would not be open until some time in May. The Baltic was practically sealed. The way to the Black Sea was closed by the Dardanelles and the Bosporus. Vladivostok was too far away to be of much use. Russia was in bonds, and it was the duty of her allies to burst them if

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they could. Immeasurable advantages would follow from the opening of a clear way to Odessa. Ships laden with wheat would stream outward and ships laden with the stores and equipment, which Russia so greatly needs, would stream inward. Moreover, the resources of fighting men, food supplies, and raw materials from Turkey in Asia would be cut off from the Central Powers and any possible menace to India, the Suez, and Egypt removed.

The political results would have been equally great. The effect upon the hesitancy of the Balkan kingdoms and other neutrals would have been instant, and would have counteracted the impression created by the successful German operations against the Russians. The fall of Constantinople would probably further have meant the collapse of the Turkish offensive. The Turks would never survive a blow at their heart. The bombardment of the Dardanelles, therefore, if the Allies had been able to carry it to its logical conclusion, would have had far-reaching effects on the conduct of the war.

It is interesting here to note the analogy between the circumstances influencing the Allies to attempt to force the Dardanelles and the circumstances during our civil war which influenced the North to open up the Mississippi. In the civil

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war it was desired to cut the Confederacy in two, so as to shut off the resources of Arkansas, Texas, and Louisiana from the Confederate armies and at the same time to open up communications between the Gulf and the Northern States via the Mississippi and its tributaries. Moreover, just as forcing the Dardanelles would have been a deterrent to Bulgaria's entering the war on the side of the Central Powers and would perhaps have influenced Greece and Rumania to declare for the Allies, so Farragut's capture of New Orleans deterred France from action hostile to the Union and caused Louis Napoleon to abandon his scheme to despatch a formidable fleet to the mouth of the Mississippi and join an equal force from England with the object of repudiating the blockade as ineffectual and demanding free egress and ingress for merchantmen.

There is also some analogy between the conditions confronting Admiral Farragut, requiring him to force his way by the Confederate forts in the lower Mississippi on his way to attack New Orleans, and the conditions facing Admiral de Robeck, supposing that his mission was to force the Dardanelles in order to attack Constantinople. Admiral Farragut was brilliantly successful in running the forts and capturing New Orleans, while the Dardanelles operations ended in bitter

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disappointment to the Allies. It would not be wise to push the analogy too closely, as erroneous inferences might be drawn; but one cannot help reflecting upon and comparing the circumstances, methods, and results attending these two great enterprises.

Instead of condemning offhand the attempt to capture Constantinople as foolhardy in conception, it might be better to ponder the possible causes of failure. Failure certainly was never due to lack of fighting qualities in the Allied sailors and soldiers, for there is probably no more heroic page in history than that recording the brave deeds done in this struggle for the Dardanelles.

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CHAPTER VII

North Sea Battles

DOGGER BANK ENCOUNTER

WITHIN a few months after the outbreak of hostilities the pressure of superior Allied sea power had effectively confined the German fleet. It is probable that the German Admiralty felt the need for a show of naval activity. Submarines and mines had accomplished some successes, but their more spectacular use had not yet developed, and cruiser raids against the British were instituted, most notable of which was the attack on the defenceless coast towns Scarboro, Hartlepool and Whitby, in which 99 people were killed. This occurred on December 16, 1914. These raids accomplished no military result, but the attempted raid of January 24, 1915, led to a running fight in the North Sea between two battle cruiser squadrons, during which the German armoured cruiser *Blücher* was sunk, having been abandoned by her retreating consorts. No English ship was lost.

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The battle cruiser engagement off the Dogger Bank was the first between modern big-gun ships. Particular interest is also attached to it because each squadron was accompanied by scouting and screening light cruisers and destroyers. It was fear of submarines and mines, moreover, that influenced the British to break off the engagement, and it is also reported that a Zeppelin airship and a seaplane took part, and perhaps assisted in the fire control of the Germans.[1]

At daybreak on January 24, 1915, Vice Admiral Sir David Beatty's battle cruiser squadron, consisting of the *Lion*, *Princess Royal*, *Tiger*, *New Zealand*, and *Indomitable*, were patrolling in company with four light cruisers, while three light

[1] The principal details of the vessels in the respective squadrons follow:

Name	Completed	Displacement	Speed	Main Armament	Armour Belt
Lion	1912	26,350	28.5	8 13.5-in.	9-in.
Tiger	1914	28,000	28	8 13.5-in.	9-in.
Princess Royal	1912	26,350	28.5	8 13.5-in.	9-in.
New Zealand	1912	18,800	25	8 12-in.	8-in.
Indomitable	1908	17,250	26	8 12-in.	7-in.
Derfflinger	1914	28,000	27	8 12-in.	11-14-in.
Seydlits	1913	24,640	29.2	10 11-in.	11-14-in.
Moltke	1911	22,640	28.4	10 11-in.	11-14-in.
Blücher	1910	15,550	25.3	12 8.2-in.	6-in.

There were 40 heavy guns in each squadron, but whereas the British included twenty-four 13.5-inch and sixteen 12-inch, the German comprised eight 12-inch, twenty 11-inch, and twelve 8.2-inch.

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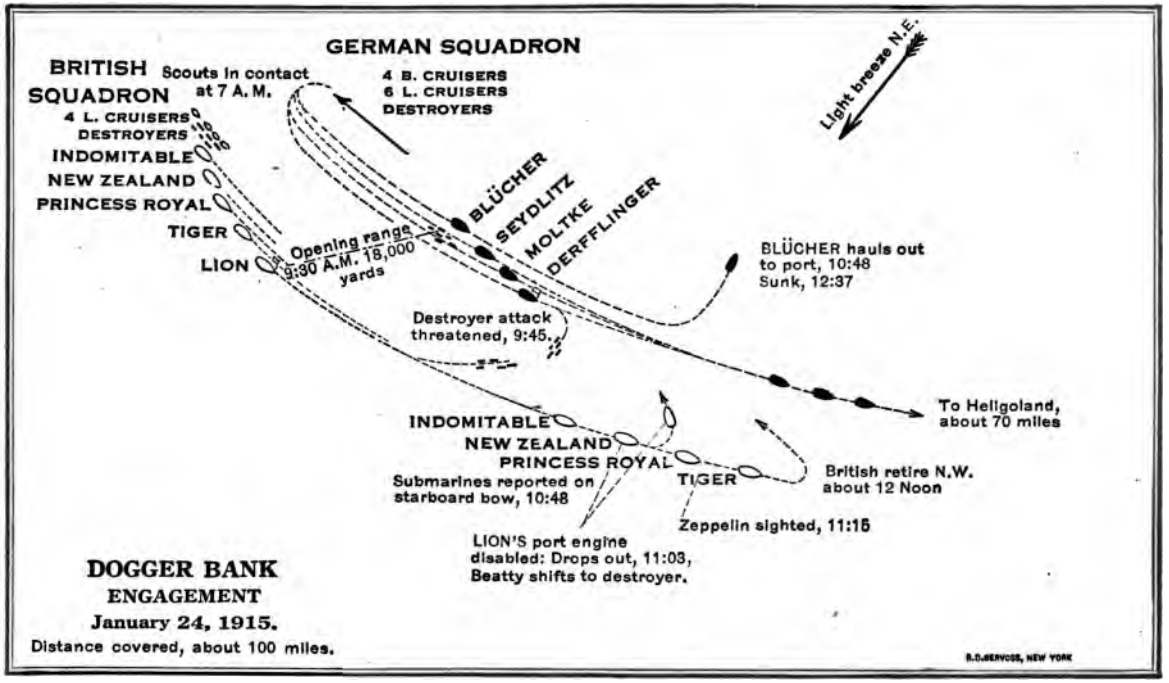

DIAGRAM OF DOGGER BANK ENCOUNTER

NOTE: German reports state that action continued from 120 miles west of Heligoland to 70 miles west. In view of the duration of the action and the speed (Br. 28–29 knots; Ger. 24–25 knots) the distance covered must have been somewhat greater. The diagram indicates academic tactics wherein the slower squadron steams on the interior arc and the faster squadron on the exterior arc of two approximately concentric curves. The exact courses of the battle are not known but it is reported that at 9:45 both squadrons made a sharper turn to the eastward than is indicated in the diagram

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cruiser flotilla leaders, with their destroyers, were in station ahead. At 7.25 a. m. the *Aurora*, one of these flotilla-leading light cruisers, engaged an enemy ship. This scouting and screening force got in touch with and guided the British battle cruisers toward the enemy battle cruiser squadron, under Rear Admiral Hipper, consisting of the battle cruisers *Seydlitz*, *Derfflinger*, and *Moltke*, with the armoured cruiser *Blücher*. The German capital ships were also accompanied by light cruisers and destroyers. It was a stern-chase fight, in which ranging shots were tried at about 20,000 yards and hits reported at about 18,000 yards. Practically all the fighting between the battle cruisers was done at long ranges. The slower armoured cruiser *Blücher* dropped astern, and early in the fight developed engine trouble. Her 8.2-inch guns were of little use, and at 10.48 she drew out of line in a defeated condition. At 12.37 she sank, having received, very likely, her deathblow from a torpedo.

Disregarding the *Blücher*, the stern fire of the German battle cruisers consisted of four twelve-inch and sixteen eleven-inch, as opposed to the British bow fire of twelve 13.5-inch guns from the leading three ships and the bow twelve-inch from the *New Zealand* and *Indomitable*. These latter two ships, however, being two or three knots

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slower than the other three, fired for the most part only at the *Blücher*. At 11.03 the flagship *Lion* was put out of action, and she was later towed into port with a considerable list. Considering the long range, the gunnery on both sides appears to have been excellent, and it is hard to say which side did the better shooting or whose battle cruisers suffered the more damage.

The light cruisers and destroyers took little part in the actual fighting. The British flotillas were kept most of the time on the unengaged quarter of Admiral Beatty's squadron. At about 9.30 the German destroyers threatened an attack, and one division of the British destroyers manœuvred so as to pass ahead of the battle cruisers and screen them; but the threatened attack was not made. Later on the German destroyers again appeared to be preparing for an attack, and the *Lion* and *Tiger* opened fire on them, causing them to retire and resume their original course. Shortly before noon, about seventy miles from Heligoland, the engagement was broken off by the British because of the presence of enemy submarines.

The conditions surrounding this battle were ideal for illustrating the functions of battle cruisers. The German warship raid on the British coast of the previous month was still fresh in mind; and when this situation off the Dogger

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Bank arose, the timely interposing of Admiral Beatty's superior force, the fast chase, the long-range fighting, the loss of the *Blücher*, and the hasty retreat of the enemy, were all particularly pleasing to the British people. As a result the battle cruiser type of ship attained great popularity.

The question of speed, armour, and armament, however, is a perplexing problem. Before going deeper into this question it is advisable to consider further data on the war-time usefulness of battle cruisers. This type of ship will therefore be adverted to later on.

BATTLE OF JUTLAND—Part I

In a narrative of the principal events of the battle of Jutland, together with a discussion of some of the points in strategy and tactics illustrated, it should be appreciated that many of the details are lacking. Some of these details will be uncovered in the course of time, but many—having been lost in the sea along with the ships that went down—can only be matter for speculation.

The battle of Jutland was fought between the British Grand Fleet and the German High Seas Fleet during the late afternoon and evening of May 31, 1916, with torpedo attacks continuing

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throughout the night. A decisive engagement was probably prevented by thick weather and approaching darkness, but hard blows were given and sustained on both sides.

It is a well-recognised experience of history that the public gauges the magnitude of a battle by the consequent changes in the political and military situation. At times a comparatively minor engagement between relatively small forces wherein little actual fighting occurs will, if followed by a decided change in an international situation, assume in the public eye the proportions of a big battle. On the other hand, it sometimes occurs that a great battle, measured by the size and power of the forces involved and the actual fighting done, will, if indecisive and unproductive of changes in the *status quo*, appear small in the public eye and often arouse popular dissatisfaction on both sides. It may be that history will place the battle of Jutland in this latter class. But, even so, when one considers the actual fighting done, and judges by the size, number, and various types of the ships engaged, their ability to manœuvre, their power to give and their power to sustain hard blows, this battle is far and away the greatest the world has ever seen. Never before has there been brought together such an array of fighting machines—dreadnoughts, battle cruisers, scout cruis-

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ers, destroyers, submarines, and aircraft. Moreover, it took intelligence, nerve, and endurance of the personnel to operate this powerful machinery under varying conditions of wind, sea, and weather. Assuredly it would seem that in this action and all that it exemplifies both in the ships engaged and in the requirements demanded of the personnel there must have been illustrated the best there is of naval art and naval science.

The British Grand Fleet comprised:

(a) An advance force under Vice Admiral Beatty, consisting of six battle cruisers, (four *Lions* of 28.5 knots speed, each carrying eight 13.5-inch guns, and two *Indefatigables* of 25 knots speed, each carrying eight 12-inch guns,) supported by the Fifth Battle Squadron, under Rear Admiral Evan-Thomas, (four 25-knot battleships of the *Queen Elizabeth* class, each carrying eight 15-inch guns).

(b) The main body, under Admiral Jellicoe—flying his flag in the *Iron Duke*—consisting of a fast wing under Rear Admiral Hood, (three 26-knot battle cruisers of *Invincible* class, each carrying eight 12-inch guns), a division of four armoured cruisers under Rear Admiral Arbuthnot, and twenty-five dreadnoughts in three squadrons commanded by Vice Admirals Burney, Jerram, and Sturdee.

(c) About twenty light cruisers and 160 destroyers, divided between the advance force and the main body.

The German High Sea Fleet comprised:

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(a) An advance force under Vice Admiral Hipper, consisting of five battle cruisers (three *Derfflingers* of probably 27 knots speed, each carrying eight 12-inch guns, and two *Moltkes* of probably 28 knots speed, each carrying ten 11-inch guns).

(b) The main body under Admiral Scheer, consisting of sixteen dreadnoughts and six predreadnought battleships.

(c) About twenty light cruisers and eighty or ninety destroyers, divided between the advance force and the main body.

At 2.30 p. m., May 31, 1916, the naval situation in the North Sea was approximately as follows: The German advance force of five battle cruisers under Vice Admiral Hipper was some eighty or a hundred miles to the northwestward of Horn Reef, while fifteen miles to the south and west of him was Vice Admiral Beatty with the British advance force of six battle cruisers, supported by four fast dreadnought battleships under Rear Admiral Evan-Thomas. Admiral Jellicoe, in command of the British Grand Fleet, was about fifty miles distant with the main body to the northeastward, while Admiral Scheer, in command of the German High Seas Fleet, was about the same distance away with his main body to the southeastward. German submarines were sighted soon after the beginning of the engagement. British and German aircraft were present, but do not

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appear to have figured very prominently in the conflict.

It is convenient to divide the battle into the following four phases:

First Phase: British advance force encounters German advance force. Six British battle cruisers, supported by four dreadnought battleships, engaged with five German battle cruisers, (3.49 *p. m. to* 4.45 *p. m.*).

Second Phase: Action between British advance force and van of High Seas Fleet. Four British battle cruisers and four dreadnought battleships engaged with five German battle cruisers and van of German battle fleet, (4.45 *p. m. to* 6.15 *p. m.*).

Third Phase: British Grand Fleet engaged with German High Seas Fleet, (6.15 *p. m. to dark*).

Fourth Phase: Torpedo attacks and screening operations during the night, (*May* 31 *to June* 1).

Each one of these phases will be taken up separately in the order named.

First Phase: Encounter Between the Battle Cruiser Squadrons Commanded by Vice Admiral Beatty (*British*) *and Vice Admiral Hipper* (*German*).

The British Grand Fleet had left its bases on the 30th, and was sweeping through the North Sea to the southward with Vice Admiral Beatty's force cruising well in advance of the main body. Besides the six battle cruisers led by Vice Admiral Beatty in the *Lion* and the four 25-knot battle-

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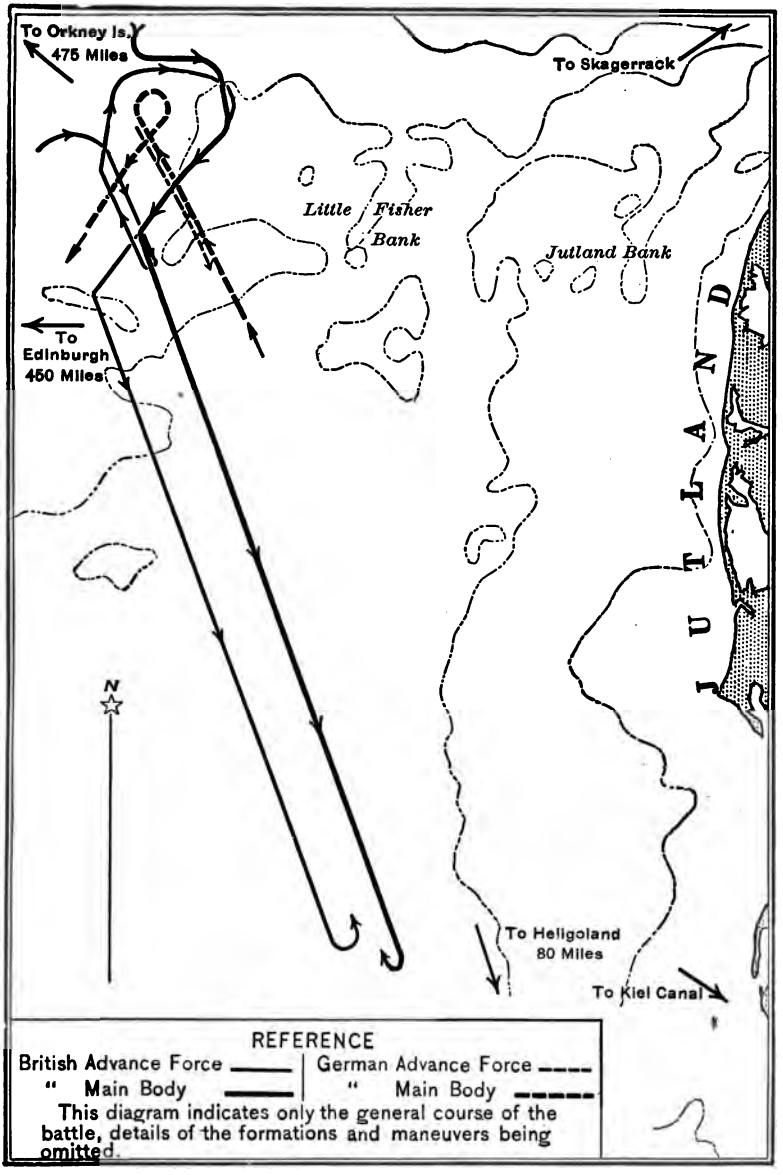

DIAGRAM OF BATTLE OF JUTLAND

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ships of the *Elizabeth* class, led by Rear Admiral Evan-Thomas in the *Barham*, this advance force was accompanied by three light cruiser squadrons and four flotillas of destroyers. At 2.20 p. m. the light cruiser *Galatea* reported the presence of German ships in considerable force and at 2.25 a British seaplane was sent from its mother ship *Engadine* to scout to the northeastward. Visibility at this time was good. The wind was southeast.

At 3.31 the German battle cruiser squadron (five ships) under Vice Admiral Hipper was sighted to the northeastward at a range of 23,000 yards. The two squadrons formed for battle, and approached each other on slightly converging southeasterly courses. Light cruisers and destroyers of both sides assumed screening formations, and the opposing light cruisers in the more advanced stations were engaged during the battle approach. At 3.48 fire was opened simultaneously by both sides at about 18,500 yards' range. The squadrons fought on parallel courses curving to the southeast. At 4.08 the battleships under Rear Admiral Evan-Thomas opened fire at 20,000 yards' range, but it is doubtful if these ships got close enough to do any effective work during this phase of the battle. About this time submarines were reported both on the engaged and unengaged beams of the British battle cruisers. De-

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stroyers were active in attempts to screen the big ships from underwater attack.

Ten minutes after the engagement became general an explosion occurred in the *Indefatigable*, and she sank almost immediately. At 4.15 twelve British destroyers moved forward to attack the German battle cruisers; German light cruisers and destroyers made a similar advance at the same time. A fierce engagement ensued between these light craft at close quarters. The Germans did not press their torpedo attack, but six of the British destroyers continued the advance under a heavy shell fire, and fired torpedoes at the German lines. At 4.30 a mighty explosion occurred in the *Queen Mary*, and she went down so quickly that the following ships in the formation are reported as having steamed right over her. At 4.42 the German battle fleet was sighted to the southeast, and the British ships turned right about (16 points = 180 degrees) in succession. The German battle cruisers also altered course 16 points, and the action continued on a northwesterly course, beginning what we will call the second phase.

According to German Admiralty reports, during the first phase, lasting about an hour, from 3.49 to the time the British changed course 16 points at 4.45, the British battle cruiser *Indefatigable*

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(tonnage 18,750, main battery eight 12-inch, carrying 899 men) was sunk at 4.05, and the *Queen Mary* (tonnage 27,000, main battery eight 13.5-inch guns, carrying 1,000 men) was destroyed at about 4:30. It is also reported that the British lost four destroyers and the Germans two. Before taking up the second phase of the battle, a few points bearing on the first phase will be briefly discussed.

Different theories have been advanced as to the probable causes of the loss of the two British battle cruisers. It is reported that both ships suffered heavy explosions which appeared to come up through turret tops. This has led to the opinion that enemy shells exploded in the respective turrets, and, igniting chains of powder to the magazines, caused the blowing up of the magazines. This is not at all unlikely, and directs attention to the need of safety precautions in the supply of ammunition to turret guns.

Following the engagement there was comment to the effect that Admiral Jellicoe violated the principle of concentration of forces by sending in advance a squadron of four battleships to support Admiral Beatty's battle cruisers. The consensus of professional opinion, however, does not appear to support any such criticism. This advance force was composed entirely of fast ships

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(the battleships had the unusually high speed of 25 knots), operating on interior lines between the supporting British fleet and the enemy main fleet, with little or no chance of being cut off by a superior enemy force.

There is also more or less criticism to the effect that Admiral Beatty rashly exposed his command; that the Germans counted on his impetuosity; and it has been said that he did just what Admiral Hipper expected him to do and wanted him to do. On the other hand, it may be argued that at the start of the action the situation was not unfavourable to the British because Admiral Hipper was almost cut off by a superior force and in danger of being compelled to turn toward the British Grand Fleet. The plan of coordination between the main body under Admiral Jellicoe and the British advance force is not clear, but it is evident that Admiral Beatty tried to get to the southward of Admiral Hipper, and upon the approach of the High Seas Fleet was compelled to make a right about turn, a manœuvre likely to prove disastrous if attempted under gun fire. Reports are somewhat obscure as to just what happened at this time, but it seems that the British ships accomplished the turn without suffering much damage, and that the German battle cruisers turned around at about the same time.

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Probably the battleships under Admiral Evan-Thomas were used to provide a covering fire while Admiral Beatty countermarched. Some incline to the opinion that Admiral Hipper failed to take advantage of his speed to draw ahead to a semi T-ing or capping position where he might have hammered Admiral Beatty's ships on the knuckle of their pivoting point without subjecting his own ships to anything worse than a long range fire from the 15-inch guns of the enemy battleships. It may be that the German battle cruisers did not have enough speed to do this, or it may be that Admiral Hipper was intent only on drawing the enemy into the fire of the approaching German battle fleet. At any rate, whatever the actual circumstances, neither side lost any ships at this time and the battle continued on northerly courses, beginning the second phase.

Second Phase: Action Between British Advance Force of Battle Cruisers, Supported by Four Battleships, and German Battle Cruisers, Supported by German High Seas Battle Fleet.

The Fifth Battle Squadron is reported to have closed the German battle cruisers on an opposite course, engaging them with all guns, when Admiral Beatty signalled Admiral Evan-Thomas the position of the German battle fleet and ordered him to alter course 16 points. At 4.57 the Fifth

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Battle Squadron fell into line astern the battle cruisers and came under the fire of the leading ships of the German battle fleet, which, in the meanwhile, had joined the line of battle in rear of Admiral Hipper's battle cruisers. The action continued at about 14,000 yards' range on northwesterly courses curving north and then northeasterly. At 5.56 Admiral Beatty sighted the leading ships of the British Baltic battle fleet bearing north, distant five miles, and altered course to east, increasing speed to the utmost, thereby reducing the range to 12,000 yards, and opening a gap between his battle cruisers and Rear Admiral Evan-Thomas's supporting battleships. The German van also turned eastward.

This completed the second phase of the battle, during which four British battle cruisers and four battleships were engaged for about one hour and a half with the van of the German fleet led by five battle cruisers followed by battleships of the *Koenig* class. Light cruisers and destroyers were also intermittently engaged during this phase and a few isolated but determined torpedo attacks were pushed home. These apparently met with little success, the attackers suffering severe punishment.

In this second phase, while at first glance it appears that four British battle cruisers supported by four battleships were engaging the entire Ger-

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man High Seas Fleet, such was not strictly speaking the case. The superior speed of the British squadrons enabled them to keep in the van, out of range of the enemy centre and rear. At this time the advantage of light was with the Germans, because the British ships had a sky brightened by the setting sun for background, while the German ships were more obscured in the mist by reason of their dark background. But the British Vice Admiral reports administering severe punishment to enemy ships during this phase. It is not clear whether the Germans turned to the eastward to avoid being capped or T-ed by the faster enemy ships, or whether they originated the easterly change of course because of the approaching British battle fleet, but this manœuvre put the British fleet in a tactically favourable position for gun fire as well as ultimately placing them between the German fleet and its bases.

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CHAPTER VIII

North Sea Battles (*Continued*)

Battle of Jutland—Part II

Third Phase: British Grand Fleet Engages with German High Seas Fleet.

DURING the first and second phases of the battle the British Grand Fleet was closing at utmost fleet speed on a southeast by south course. Three battle cruisers, led by Rear Admiral Hood in the *Invincible*, together with screening light cruisers and destroyers, were in advance operating as a fast wing. At 5.45 an outpost light cruiser was engaged with a division of German light cruisers. At 6.10 Admiral Beatty's engaged squadron was sighted by the *Invincible*. At 6.21 Admiral Hood led his squadron into action, taking station in the van just ahead of the *Lion* and closing at 6.25 to a range of 8,000 yards. A few minutes later the *Invincible* was sunk by gun fire.

In the meanwhile the British battle fleet was coming into action, filling the previously mentioned gap opened up between Admiral Beatty and Rear Admiral Evan-Thomas. At 5.55 ad-

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vanced British armoured cruisers, light cruisers, and destroyers were engaged with German cruisers and destroyers. At 6.16 the armoured cruisers *Warrior*, *Black Prince*, and *Defence* under Sir Robert Arbuthnot were drawn between the lines and disabled by close-range fire from the German battleships. At 6.14 Admiral Jellicoe formed the Grand Fleet in battle line, and during deployment at 6.17 the first battle squadron opened fire on a German battleship of the *Kaiser* class. At 6.30 the other battle squadrons engaged ships of the *König* class. The four battleships of the *Elizabeth* class, previously engaged during the second phase, formed astern of the main battle fleet. At this time the *Warspite* of this fifth battle squadron had her helm jam with right rudder, causing her to turn toward the German line, where she was subjected to severe fire, but the trouble being soon corrected she was extricated from this predicament. Admiral Jellicoe reports:

> Owing principally to the mist, but partly to the smoke, it was possible to see only a few ships at a time in the enemy's battle line. Toward the van only some four or five ships were ever visible at once. More could be seen from the rear squadron, but never more than eight to twelve. . . . The action between the battle fleets lasted intermittently from 6.17 p. m. to 8.20 p. m., at ranges between 9,000 yards and 12,000 yards. During this time the British fleet made alterations of course from south-

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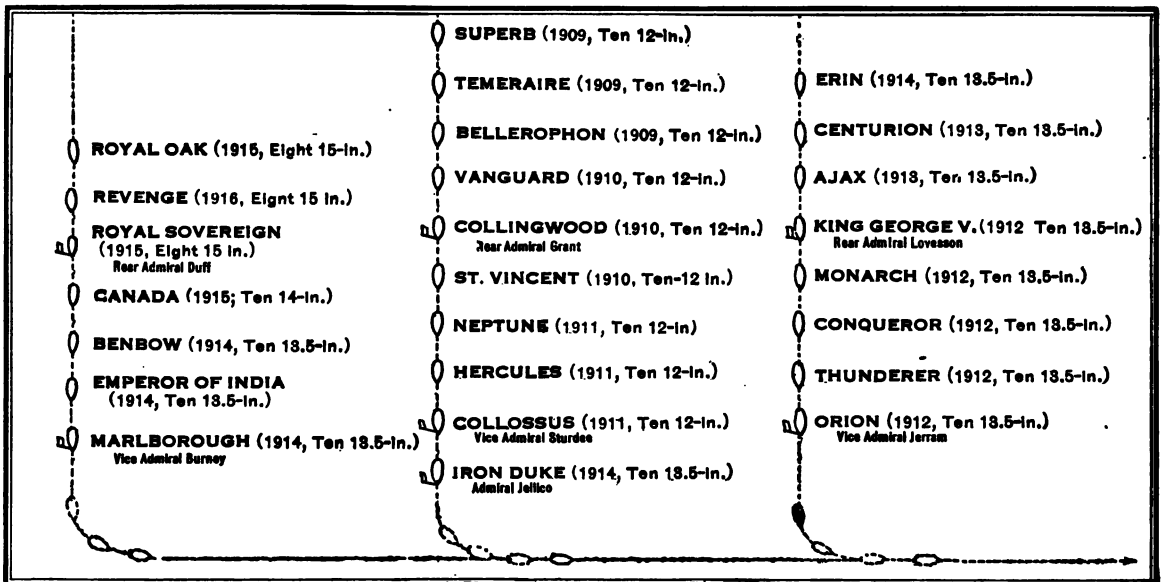
ROYAL OAK (1915, Eight 15-in.)
REVENGE (1916, Eight 15 in.)
ROYAL SOVEREIGN (1915, Eight 15 in.)
Rear Admiral Duff
CANADA (1915; Ten 14-in.)
BENBOW (1914, Ten 13.5-in.)
EMPEROR OF INDIA (1914, Ten 13.5-in.)
MARLBOROUGH (1914, Ten 13.5-in.)
Vice Admiral Burney
SUPERB (1909, Ten 12-in.)
TEMERAIRE (1909, Ten 12-in.)
BELLEROPHON (1909, Ten 12-in.)
VANGUARD (1910, Ten 12-in.)
COLLINGWOOD (1910, Ten 12-in.)
Rear Admiral Grant
ST. VINCENT (1910, Ten-12 in.)
NEPTUNE (1911, Ten 12-in)
HERCULES (1911, Ten 12-in.)
COLLOSSUS (1911, Ten 12-in.)
Vice Admiral Sturdee
IRON DUKE (1914, Ten 13.5-in.)
Admiral Jellico
ERIN (1914, Ten 13.5-in.)
CENTURION (1913, Ten 13.5-in.)
AJAX (1913, Ten 13.5-in.)
KING GEORGE V. (1912 Ten 13.5-in.)
Rear Admiral Lovesson
MONARCH (1912, Ten 13.5-in.)
CONQUEROR (1912, Ten 13.5-in.)
THUNDERER (1912, Ten 13.5-in.)
ORION (1912, Ten 13.5-in.)
Vice Admiral Jerram

BRITISH FLEET FORMATION

Above is shown the probable formation of the Grand Fleet for the approach and how the three squadrons may be swung into the battle column of "line ahead." If, during the approach, it is desired to gain distance to either the right or left all ships may simultaneously turn to the right or left through any angle designated, turning back again before forming column for battle. The battle line may be formed by one 90° turn as shown above or by a succession of oblique movements.

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east by east to west (168¾ degrees) in the endeavour to close, but the enemy constantly turned away and opened the range under cover of destroyer attacks and smoke screens. The alterations of course had the effect of bringing the British fleet (which commenced the action in a position of advantage on the bow of the enemy) to a quarterly bearing from the enemy's battle line, but at the same time placed us between the enemy and his bases. During the somewhat brief periods that the ships of the High Seas Fleet were visible through the mist the heavy and effective fire kept up by the battleships and battle cruisers of the Grand Fleet caused me much satisfaction, and the enemy vessels were seen to be constantly hit, some being observed to haul out of the line and at least one to sink. The enemy's return fire at this time was not effective and the damage caused to our ships was insignificant.

From the reports it appears that the area of the battle was covered by mist and smoke of varying density, interspersed with sections wherein opposing ships could see each other at the battle range. This gave rise to a series of local actions during which all ships of the battle fleet became engaged, but at no time simultaneously. These detached actions were for the most part between few ships for brief periods. The aggregate fighting, however, seems to have been considerable, as may be gathered from the following synopsis of the principal incidents reported by Admiral Jel-

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licoe and Vice Admiral Beatty. The following extract is from the report of the former:

At 6.17 the third battle squadron engaged German battleships, battle cruisers, and light cruisers at a range of 11,000 yards. The fourth battle squadron, in which was placed the Commander in Chief's flagship *Iron Duke*, engaged the battle squadron, consisting of the *König* and *Kaiser* classes, as well as some of the German battle cruisers and light cruisers. The mist rendered range taking difficult, but the fire of the squadron was effective. The *Iron Duke* opened at 6.30 on a battleship of the *König* class at 12,000 yards range, hitting on the second salvo, and continuing to hit until the target ship turned away. The fire of other ships of the fourth squadron was principally directed at enemy battle cruisers and cruisers as they appeared out of the mist. The ships of the second battle squadron were in action with vessels of the *Kaiser* and *König* classes between 6.30 and 7.20, and fired also at a battle cruiser which had dropped back, apparently severely damaged. The first battle squadron received more of the return fire than the remainder of the main fleet. The *Colossus* was hit, but not seriously damaged, and other ships were straddled with fair frequency by the German salvos.

Admiral Jellicoe made special mention of the *Marlborough* of the third battle squadron, stating that at 6.17 she fired seven salvos at a German battleship of the *Kaiser* class, then engaged a cruiser and again a battleship. At 6.54 she was

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hit by a torpedo and took up a considerable list to starboard, but at 7.03 reopened on a cruiser, and at 7.12 fired fourteen rapid salvos at a battleship of the *König* class, hitting her frequently until she turned out of line. These details in the case of the *Marlborough* permit some rather interesting speculations. It seems that this ship alone fired approximately between 200 and 250 13.5-inch shells, each one weighing about 1,240 pounds, aggregating in the neighbourhood of 140 tons of high explosive steel shell, at the effective battle range of 12,000 yards in the beginning, and closing to 9,000 yards during the course of the action. If this is at all indicative of the fighting done by the other battleships of the main body it is apparent that a considerable weight of metal was let loose. In the first and second phases it is estimated that each of the ships under Vice Admiral Beatty and Rear Admiral Thomas fired four or five times this amount (about 600 tons each) and the Germans quite as much, if not more.

After the injury to the *Marlborough* Vice Admiral Burney transferred his flag to the *Revenge*.

It appears that the British battle cruisers after the loss of the *Invincible* were out of action for about half an hour. At about 6.50 the two remaining ships of Admiral Hood's squadron were ordered to prolong Admiral Beatty's line astern,

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and, having lost sight of the enemy, the battle cruiser squadrons reduced speed to 18 knots. Course was gradually changed to south and then to southwest in an effort to regain touch with the enemy. At 7.14 two German battle cruisers and two battleships were sighted at about 15,000 yards' range, bearing northwesterly. At 7.17 Admiral Beatty's ships re-engaged and increased speed to 22 knots. At 7.32 the British battle cruisers had again reduced speed to 18 knots. German destroyers advanced, emitting clouds of dark grey smoke, under which screen the German capital ships turned away and were lost sight of at 7.45. British light cruisers were ordered to sweep westward to regain touch, and at 8.20 Admiral Beatty ordered a westerly course in support.

Soon afterward German battle cruisers and battleships were heavily engaged at 10,000 yards' range. Admiral Beatty reports that the leading ship was hit repeatedly by the *Lion* and turned out of line eight points, emitting high flames; that the *Princess Royal* set fire to a three-funnel battleship, and that the *New Zealand* and *Indomitable* both engaged the third ship, forcing her to haul out of line on fire and heeling over. The mist at this time shut them from view, but the *Falmouth* reported the German ships as last seen at 8.38, steaming to the westward. The British

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battle cruisers did not regain touch, and at 9.24 changed to the southerly course set by Admiral Jellicoe for the battle fleet.

During the third phase the conditions of mist and failing light favoured torpedo attack, but few details have been reported. Light cruisers of the fourth squadron occupied a position in the van until 7.20 p. m., when they carried out orders to attack German destroyers. Again at 8.18 p. m. these light cruisers moved out to support the eleventh destroyer flotilla in a torpedo attack. They came under a heavy fire from the enemy battle fleet at ranges between 6,500 and 8,000 yards, but succeeded in firing torpedoes at German battleships.

At 6.25 the third light cruiser squadron attacked the German battle cruisers with torpedoes, and the *Indomitable* reported that a few minutes later a German battle cruiser of the *Derfflinger* class fell out of line. This may have been the *Lützow*, as at about this time Vice Admiral Hipper, while under a heavy fire, transshipped his flag in a destroyer from the disabled *Lützow* to the *Derfflinger*.

It is thus seen that during the third phase, lasting from 6.15 to about 8.30 p. m., practically the entire British Grand Fleet was engaged with practically the entire German High Seas Fleet. Early

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in the phase the British armoured cruiser *Defence* (tonnage 14,600, carrying four 9.2-inch guns and 755 men) was sunk. At the same time the armoured cruiser *Warrior* (tonnage 13,500, carrying six 9.2-inch guns and 704 men) and her sister ship, the *Black Prince*, were disabled. The *Warrior* was taken in tow by the *Engadine*, but broke away during rough weather in the night, and sank after the crew had been taken off. The *Black Prince* came in close contact with a German battleship during the night and was sunk by gunfire. Rear Admiral Hood's flagship, the *Invincible* (tonnage 17,250, carrying eight 12-inch guns and 750 men), was sunk soon after engaging.

Between 6 and 6.30 the Germans lost the light cruiser *Wiesbaden*. The German battle cruiser *Lützow* (tonnage 28,000, carrying ten 12-inch guns and 750 men) was disabled, and sank while returning to port. The German battleship *Pommern* (tonnage 13,040, carrying four 11-inch guns and 750 men) was probably disabled during the day battle and sunk in the night by a torpedo. The German light cruisers *Frauenlob* and *Rostock* were destroyed in the evening fighting, while the light cruiser *Elbing* was abandoned because of damage due to collision with another German ship. According to official admission, each side seems to have lost about four destroyers, either

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during this phase or during the night fighting.

The details of how Admiral Jellicoe manœuvred his ships into action were not disclosed in his report, but the British battle fleet probably approached with squadrons or divisions in line or line of bearing. That is, the ships were in several parallel columns on a southerly course, with the leading ships in a line approximately east and west, at such a distance apart as to permit all ships to swing into one column, heading either east or west. The deployment into a battle line heading easterly seems to have been skillfully effected under trying conditions. Just what the relative positions of the two fleets were during this phase is not known, but the British would appear to have had a tactical advantage in turning the German van. The conditions of poor visibility, however, did not permit them to get full benefit of it, although they had the German ships backed by the twilight sky, an important advantage, which must have increased as darkness approached.

Fourth Phase: Torpedo Attacks and Fighting During the Night of May 31 to June 1.

Admiral Jellicoe reports that after the arrival of the Grand Fleet the tactics of the Germans were generally to avoid further action, in which

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they were favoured by conditions of visibility.

At this stage of the battle, shortly after 8.40, Admiral Jellicoe quotes Vice Admiral Beatty as follows:

> In view of the gathering darkness, and the fact that our strategical position was such as to make it appear certain that we should locate the enemy at daylight under most favourable circumstances, I did not consider it desirable or proper to close the enemy battle fleet during the dark hours.

Admiral Jellicoe then reports:

> At 9 p. m. the enemy was entirely out of sight, and the threat of torpedo boat destroyer attacks during the rapidly approaching darkness made it necessary for me to dispose of the fleet for the night, with a view to its safety from such attacks, while providing for a renewal of action at daylight. I accordingly manœuvred to remain between the enemy and his bases, placing our flotillas in a position in which they would afford protection to the fleet from destroyer attack and at the same time be favourably situated for attacking the enemy's heavy ships.

The British fleet, after making dispositions to guard against night torpedo attacks, steamed at moderate speed on southerly courses. Consequently during the night the British heavy ships were not engaged, but Admiral Jellicoe reports that the British Fourth, Eleventh, Twelfth, and

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Thirteenth Flotillas delivered a series of successful torpedo attacks.

Apart from the proceedings of the flotillas, the second light-cruiser squadron, stationed in the rear of the battle fleet, was in close action for about fifteen minutes at 10.20 p. m. with a German squadron, comprising one large cruiser and four light cruisers. In this action the *Southhampton* and the *Dublin* suffered rather heavy casualties, although their steaming and fighting qualities were not seriously impaired.

This night fighting comprises an interesting and perhaps an important phase of the battle, but too little is known about it at this time to permit profitable discussion. During both the day and night conditions were favourable for the use of torpedoes. Destroyer attacks seem to have been numerous, persistent, and daring. It may be assumed that a great many torpedoes were fired, but the resulting damage does not appear to have been very extensive.

Early on the morning of June 1 (3 a. m.) Admiral Jellicoe's battle fleet was to the westward of Horn Reef, some ninety miles from the battlefield, as shown on the chart. The British fleet then turned to the northward and retraced its course.

Visibility was three to four miles. Admiral

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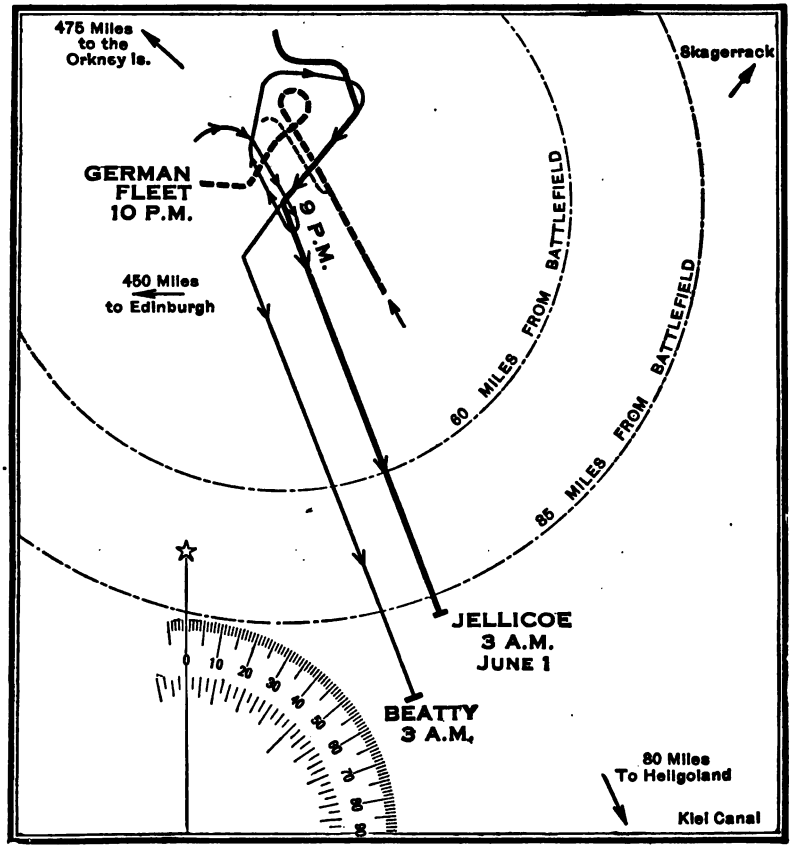

DIAGRAM INDICATING FLEET MOVEMENTS AFTER BATTLE OF JUTLAND

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Jellicoe reports that the British fleet remained in the proximity of the battlefield and near the line of approach to German ports until 11 a. m., June 1; that the position of the British fleet must have been known to the enemy, because at 4 a. m. the fleet engaged for about five minutes a Zeppelin which had ample opportunity to note and subsequently to report the position and course of the British fleet; that the waters from the latitude of Horn Reef to the scene of the action were thoroughly searched, but no enemy ships sighted; and that at 1.15 p. m., it being evident that the German fleet had succeeded in returning to port, course was shaped for British bases, which were reached without further incident. By 9.30 p. m. of the next day, June 2, the fleet having fueled and replenished with ammunition, was reported ready for further action.

The conduct of the British fleet on the evening of May 31, during the night, and on the morning of June 1 raises a good many perplexing questions. In the morning the British ships retraced their tracks to the northward, taking about the same lane they had followed in the night.

Considerable criticism has been made of Admiral Jellicoe for not pressing the retiring enemy ships on the evening of May 31. Did approaching darkness, threat of destroyer attack, and the

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weather conditions constitute adequate reasons for not closing an enemy inferior in numbers, in gun power and in speed? This will probably be a much discussed question for many years to come.

Also many people are puzzled that, with the Grand Fleet in position to put itself between the German High Seas Fleet and its bases, there was no decisive engagement on the following day, June 1. A study of the chart on page 113 indicates that the fleets could not have been very far apart. Considering that the June nights between evening and morning twilight are only five hours long in these latitudes, and also considering the numerous scouts, both German and British, it looks as though they should have been pretty well informed of each other's whereabouts. But before criticising Admiral Jellicoe for not pressing a renewal of the engagement, it might be well to reflect upon the conditions confronting him on that morning: Visibility only three to four miles; close to enemy bases and comparatively far from home bases; a fleet somewhat knocked about after the previous day's fighting, and no doubt a number of the ships short of both fuel and ammunition; destroyers and light cruisers scattered, many more or less damaged, and perhaps the majority with torpedoes expended; an enemy skilled in the use of submarines and mines.

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It is hard for persons unused to the sea to visualise the conditions and circumstances attending this engagement. Even seagoing men of excellent balance are liable, when transplanted temporarily to the tranquillity of a war college, to be somewhat influenced by environment, and, while in enthusiastic search of illustration for pet theories, they may overlook or fail to give due weight to modifying factors which cannot be simulated on the game board. Students of tactics on shore make their decisions after study and discussion in the comfortable quiet of a well-lighted room, and then use T square and ruler to move their miniature ships on a motionless wooden ocean. The fighters of the Jutland battled faced quite a different proposition. Decisions had to be made quickly, accurately transmitted by signal, and promptly carried out on a sea darkened by mist, smoke, and approaching night. All this had to be done, moreover, in the midst of battle, under the strain of apprehension, in the uncertainties of meagre and conflicting information.

The actual results of the Battle of Jutland did not change the military situation. The British control of the sea remained an absolute factor, as before the battle, and the German High Seas Fleet continued to be a fleet in being and a menace to its

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enemies. Consequently the battle must be classed as indecisive.

Moral effect is an important factor in war, and, although the military situation was not changed by the Battle of Jutland, there is no question of the fact that the German public was elated by the statement from Berlin that the British fleet had been withdrawn from the field of battle. This manœuvre, however, was because of night-fall and was toward the German base of Heligoland, not toward British home bases. This should be convincing rebuttal to Germany's claim that her fleet gained a victory.

Those who support Admiral Jellicoe in his decision not to close the enemy battle fleet, maintain that, inasmuch as naval superiority was essential to the Allied cause, it should not have been risked upon such a hazard as would have been involved by continuing the battle under the conditions which have been described. On the other hand, many hold the opinion that the destruction of the German fleet was of such urgent importance as to justify this risk. It is too soon to seek a final solution of so intricate a problem.

The following is the British statement of losses:

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BATTLE CRUISERS

	Tonnage	Armour Belt	Main Battery	Speed	Men	C'p'd
Queen Mary	27,000	9 in.	8 13.5-in.	28	1,000	'13
Indefatigable	18,750	8 in.	8 12-in.	26	899	'11
Invincible	17,250	7 in.	8 12-in.	26	750	'08

ARMOURED CRUISERS

Defense	14,600	6 in.	4 9.2-in.	23	755	'08
Black Prince	13,550	6 in.	6 9.2-in.	20.5	704	'06
Warrior	13,550	6 in.	6 9.2-in.	22.9	704	'08

DESTROYERS

Tipperary	1,900	...	.....	31	160	'14
Turbulent	...	...	.....	..	..	..
Fortune	920	...	.....	29.50	100	'12
Sparrow Hawk	950	...	3 4-in.	31.32	100	'12
Ardent	950	...	3 4-in.	31.32	100	'12
Nomad	...	...	.....	..	..	..
Nestor	...	...	.....	..	..	..
Shark	950	...	3 4-in.	31.32	100	'12

The following is the German statement of losses:

BATTLESHIP

	Tonnage	Armament	Speed	Date Completion
Pommern	13,040	4 11-in. 14 6.7-in.	19	1907

BATTLE CRUISER

Lützow	28,000	8 12-in. 12 6-in.	27	1915

LIGHT CRUISERS

Rostock	4,820	12 4.1-in.	27.3	1914
Frauenlob	2,656	10 4.1-in.	21.5	1903

NEW LIGHT CRUISERS

Elbing	....	.....	....	.....
Wiesbaden	....	.....	....	.....

DESTROYERS

Five	....	.....	....	.....

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The following are the totals of tonnage and personnel reported lost:

TOTAL TONNAGE LOST

British	117,150
German	60,720

TOTAL PERSONNEL LOST

British	6,105
German	2,414

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CHAPTER IX

Submarine Warfare

THROUGHOUT the war the submarine was a conspicuous naval weapon, and German science developed it with characteristic energy, system, and thoroughness. In the first months the more powerful Allied navies practically swept the seas of all enemy merchant ships and contained the battle fleets of the Central Powers within comparatively narrow limits. Beyond these limits, except for a few raids on commerce by surface cruisers, the naval operations of both Germany and Austria were restricted to the use of submarines.

Considering the disadvantages inherent in underwater navigation, the results attained were truly astonishing. The following incidents may be mentioned as examples of various and numerous submarine activities. In the first days of the war one small German submarine sank three British armoured cruisers in less than one hour. On Oct. 7, 1916, the U-53 appeared in Newport Harbor, exchanged official calls, read the daily

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papers, sent dispatches, and departed a few hours after her arrival. The next day the U-boat destroyed off Nantucket four British traders and one Dutch trader. In the Spring of 1917 a German submarine bombarded peaceful Funchal. Also before the entry of the United States into the war Captain König introduced a new type, a commercial submarine, the successful trans-Atlantic blockade runner, *Deutschland*. In addition, the underwater mine layer was developed, and it is disturbing to think of how this huge mechanical fish secretly threaded the ocean highways, laying its engines of destruction. Finally, U-boat cruisers of about 2,800 tons' displacement, nearly 300 feet long, fitted with a double bottom multiple compartment protection utilized for carrying oil to permit a cruising radius of about 18,000 miles, and mounting 5.9 inch guns, besides carrying torpedoes, are reported to have appeared and taken part in the war. The U-boat as an outlaw commerce destroyer did enormous damage.

It is not surprising that the submarine seized upon the imagination. And Germany took advantage of the mystery surrounding underwater attack to circulate propaganda designed to strengthen hopes at home, and at the same time break down morale in enemy countries. This resulted in a somewhat confused perspective. In

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studying this phase of the war, therefore, it is important that we should search out the facts, reason to logical conclusions, and take the true measure of the U-boat.

The outstanding characteristic of the submarine, as its name indicates, is its ability to navigate below the surface of the water. This enables it to evade the enemy, to make a surprise attack, and to escape by hiding. These faculties are manifestly suitable for the weaker belligerent to use against the stronger enemy. Navies that dominate, that have power to seek and destroy in the open, are not dependent upon abilities to evade and to hide. It is for this reason that Allied submarines found their chief opportunity to strike in sea areas controlled by the fleets of the Central Powers, the Baltic, the Dardanelles, and other waters close to Teutonic bases, while German submarines were active in all other ocean areas within the cruising radius of their U-boats. Since the Allies controlled practically all the high seas, the field of the U-boat was large, while the activities of Allied submarines were confined to the relatively narrow coastal waters controlled by Germany, Austria, and Turkey.

Without depreciating the utility of the submarine, it may be truly said that if the Allies had not possessed a single one they would still have

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enjoyed the incalculable advantages of control of the high seas. The German U-boats, moreover, did not prove effective against enemy battle fleets. In order to facilitate submarine commerce-destroying operations Germany found it necessary, because of inherent weaknesses in underwater craft, to adopt methods in violation of the laws of civilised warfare. Before going deeper into the uses and limitations of the submarine it might be well to touch briefly upon some of the rules governing its legitimate employment.

The purpose of rules regulating ocean-borne intercourse in times of peace and governing both belligerent and neutral conduct in time of war is to carry out practically the principles of the freedom of the seas, and it need hardly be added that these principles are identical with those governing all rules of right conduct at sea and on shore; namely, principles of liberty, justice, and humanity.

As weapons and other conditions change, new situations arise which may require modifications in these rules; but both in time of peace and in time of war reason calls for a general concurrence of Governments before a modified or new rule can become operative; and any belligerent instituting methods in violation of previously established regulations assumes the burden of proof to

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show that new conditions compel new rules in order to carry out the never-changing principles of the freedom of the seas.

There is little room for confusion of thought on this point. Unfortunately, however, it is the experience of war-time practice that military necessity and the doctrine of "might makes right" twist these rules into a bewildering tangle. One belligerent breaks a rule and attempts to justify his conduct. The enemy, as a matter of policy, turns a deaf ear to the arguments in justification, and, seeing only the broken rule, proceeds to retalitate by breaking another rule on the ground that military necessity forces him to resort to this act of reprisal. And so one act of reprisal leads to another until unconscionable degrees of lawlessness are reached.

It has been suggested as a possible solution obviating the difficulties of drawing up a set of good working rules to govern naval operations against commerce that one sweeping sanction of immunity might suffice by which all trade ships would be allowed to carry on their peaceful pursuits unmolested in time of war as in time of peace. The objection, however, to such a rule is, that when the world is divided between nations at peace and nations at war, this rule would satisfy peoples at peace and one side of the belligerents, but the

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other belligerents would find it discriminatory and would oppose it as an infringement upon their rights to use the seas in accordance with principles of equity and freedom.

To deny belligerents, moreover, their right to use the seas for suppressing enemy commerce and imposing economic pressure in order to hasten the settlement of their differences, would deprive the world of what is generally looked upon, when conducted according to the rules of civilised warfare, as a humane method of re-establishing conditions of peace. It may be added that those who aim at a world peace secured by a concert of power may reasonably assert that, while the freedom of the seas is a foundation principle on which to make a world peace secure, naval power, by instituting blockades, may at times prove a humane and effective means of compelling recalcitrant Governments to observe the provisions of this peace.

During a war, the maritime interests of belligerents and neutrals are bound to conflict; and it is impossible to give either of them unlicensed use of the seas without restricting the freedom of the other. Hence a compromise is necessary, and so long as nations recognise a state of war as involving conditions subject to law in which both belligerents and neutrals have rights, it is manifest that rules are required to define and guarantee

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these rights. It will not be attempted here to examine closely the many rules drawn to govern naval warfare, some of which were still subjects of controversy when the great war began; but, as an aid to the memory, a few of the recognised and established regulations affecting the use of the submarine will be briefly outlined:

1. A blockade to be binding must be effective; that is, it must be maintained by a force sufficient to render ingress to or egress from the enemy coast line dangerous.

2. A blockade must not bar access to neutral ports or coasts.

3. During the continuance of a state of blockade no vessels are allowed to enter or leave the blockaded place without consent of the blockading authority.

4. The prohibition of contraband trade with the attendant adjudging of penalties is a belligerent right. This right can only be exercised upon the high seas and the territorial waters of the belligerents and in accordance with the rules and usages of international law. (Contraband of war may be defined as articles destined for the enemy and capable of use as an assistance to the enemy in carrying on war either ashore or afloat.)

5. Lawfully commissioned public vessels of a belligerent nation may exercise the right of visiting and searching merchant ships upon the high seas, whatever be the ship, the cargo, or the destination. If the examination of ship's papers and search show fraud, contraband, an offence in respect of blockade, or enemy service, the vessel may be seized. Force may be used to over-

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come either resistance or flight, but condemnation follows forcible resistance alone. In exercising these rights belligerents must conform to the rules and usages of international law.

6. When a vessel in action surrenders (usually indicated by hauling down the national flag or showing the white flag of truce), firing must cease on the part of the victor. To continue an attack after knowledge of surrender, or to sink a vessel after submission, is a violation of the rules of civilised warfare only permissible in cases of treachery or renewal of the action.

7. Absolute contraband, including guns, ammunition, and the like, is liable to capture on the high seas or in the territorial waters of the belligerents if it is shown to be destined to territory belonging to or occupied by the enemy, or to the armed forces of the enemy. It is immaterial whether the carriage of the goods is direct or entails transshipment, even at a neutral port, or a subsequent transport by land, although it may be through neutral territory. Also there must be a trial and judgment of a prize court of the captor having proper jurisdiction in regard to the goods involved, whether destroyed or not.

The status of armed merchantmen is generally misunderstood. Merchantmen have the right to arm for defence. A merchantman may repel an attack by any enemy ship, but only a man-of-war can attack men-of-war.

According to international law the character of a ship is determined by her employment; and it is

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an established right of merchant vessels that they may carry arms—for defence only—without necessarily altering their status before the law as traders engaged in legitimate peaceful pursuits. This right is well established by precedent, and although prolific of complications, it has on the whole operated to sustain the principles of freedom of the seas. Its usefulness was conspicuous in the days of piracy; and the "long toms" on board our clipper ships proved strong arguments in suppressing lawlessness.

In the heat of war, moreover, belligerents are inclined to infringe the privileges of noncombatants, and experience has shown that the right of merchant vessels to arm for defence has tended to prevent belligerents from unlawful interference with peaceful traffic. The belligerent right to stop, visit, search, and capture merchantmen is a high sovereign power, and it seems reasonable to require that the vessels authorised to exercise it should possess potential strength. It would be a somewhat absurd condition, inviting abuse and irregularity, if rules were so framed as to permit a fast enemy motor boat, manned by three or four men armed with rifles, to stop, search, and capture an ocean liner, without allowing the liner to attempt lawfully either flight or resistance. On the other hand, a motor boat, submarine, or any

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other duly commissioned and authorised man-of-war has the right to employ force to overcome resistance or to prevent flight; and the merchantman has no redress for damage sustained during attempted flight or resistance. In the majority of cases, it is obvious that prudence will influence merchantmen to surrender promptly in the face of a respectably powerful man-of-war rather than forfeit immunity by attempting flight or resistance.

If an armed merchantman of a neutral country on friendly terms with the warring nations should resist by force a belligerent man-of-war, the neutral Government would properly discountenance the act as incompatible with the relations of amity existing between the two countries. If, however, neutral rights are violated to an intolerable degree a state of armed neutrality may supplant the relations of amity, and under these unusual conditions a Government has the right and may be in duty bound to preserve its neutrality by using such force as the circumstances may require; but in this delicate situation care must be exercised that force is used only in defence of neutral rights.

From the beginning of the war submarines helped to prevent a close blockade of the coasts of the Central Powers, and the inability on the

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part of the Allied navies to institute a coast line blockade strictly in accordance with the established rules of international law led to what is generally known as a distant blockade. The British Orders in Council regulating this distant blockade lengthened the contraband lists and extended the doctrine of ultimate destination until Germany's commerce with non-contiguous countries was practically cut off.

As the effectiveness of the blockade increased, Germany retaliated by taking undue advantage of the war area doctrine, and claimed increasing latitude in the use of the U-boats. As in the case of the invasion of Belgium, Germany made military necessity the excuse for the illegal acts of the German Navy. Underwater attack against the blockading battle fleets met with little success; but the unscrupulous use of the submarine as a commerce destroyer brought better results. The vigorous protest of neutrals against the violation of their rights caused Germany, for a time, to make an effort to comply with the rules and usages of international law; but this effort proved ineffectual. The vulnerability of the submarine, with the increasing efficacy of the ways and means developed to safeguard merchantmen from its attack, presented to the German Government the alternative either of suffering a curtailment of submarine

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effectiveness or of abandoning lawful methods. Germany's decision to take the latter course was announced to the world by official notification that within a war zone embracing large areas of the high seas her submarines would sink all ships, neutral or belligerent.

This unwarranted course forced the United States into the war against Germany, and aroused the hostility of a great part of the world. Even from the German point of view, the only thing that would have made the result profitable would have been to win a decision in the war by means of the U-boats. This Germany did not succeed in accomplishing. Although there were enormous losses of shipping, the submarines did not succeed in shutting off transportation by sea.

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CHAPTER X

Anti-Submarine Tactics

THE cruising radius of the larger submarines ranges from about 6,000 miles to 9,000 miles (18,000 miles is the reported radius of the most recent cruiser type) when steaming on the surface at a slow speed of five to ten knots. The newer boats are reported to have a maximum speed of eighteen knots, but economy of fuel is so important, and the consumption is so much greater for high speeds, that submarines use the economical slower speeds except perhaps for short spurts. It is obvious that submarines operating from distant bases cannot well afford to chase merchantmen unless the latter happen to be slow ones. Their usual procedure is to lie in wait along the trade routes and attack the ships which run up to them.

Submarines, after cruising a certain distance while submerged, are compelled to come to the surface to recharge their batteries. Here again the maximum submerged speed of about fourteen knots for the newer boats and about ten knots for the older types is extremely uneconomical. For

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example, approximately speaking, the average submarine when submerged can go four to five hours at ten knots, a total distance of about forty miles; or ten hours at about seven knots, a total distance of seventy miles; or thirty-six hours at about four knots, a total distance of 144 miles; or seventy-two hours at steerage way (about two and one-half knots), a total distance of 180 miles. The more recent U-boats can go much farther, under favorable conditions as far as 250 miles, at a stretch without coming to the surface. But when the limit is reached, whatever it may be, the submarine must stop and wait for an opportunity to come to the surface to recharge batteries.

It follows, then, that anti-submarine tactics which force the enemy to go comparatively long distances at high speeds tend to limit their activities. Experience has taught submarine commanders that when the prospects are such as to promise considerable uneconomical cruising, either on the surface or submerged, it is usually a wise policy to abandon the attack.

The armament of submarines consists of both guns and torpedoes. The hull of the newer types is protected to some extent by armour, but even so a gun engagement with a well-armed enemy involves great risk. The practice of arming merchant ships has forced commerce-destroying sub-

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marines to rely on the torpedo as the principal weapon of attack.

The general characteristics of the torpedo are now pretty well known. It is a highly scientific mechanism consisting of many intricate parts ingeniously assembled in a metal shell about twelve to twenty feet long, twenty-one inches in diameter, weighing about one ton, and valued in this country at about $6,000. In appearance a torpedo somewhat resembles a small, elongated auto-submarine. It has horizontal and vertical rudders which can be so adjusted, in conjunction with an automatic steering device, as to make the torpedo keep at a certain depth and either travel straight or in a curve. The torpedo is propelled by a screw driven by an automatic compressed air engine, capable of giving a speed as high as thirty-six knots. By the act of launching from the tube a starting lever is tripped, which causes the propelling mechanism to go ahead at full speed. The head of the torpedo carries a powerful bursting charge. The object of submarine tactics is to detonate this high explosive against the underwater body of the target ship.

To accomplish this object the submarine commander has to make preliminary observations through his periscope, estimate the course, speed, and distance of the enemy, manœuvre his boat to

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a favourable position, make the necessary firing adjustments, aim the torpedo, and then launch it.

It is obvious that the closer the target the better the chances of scoring a hit. As a general rule it is not profitable for submarines to fire torpedoes at greater ranges than one thousand yards because the percentage of hits at longer ranges is comparatively small. Glancing hits, moreover, are not often effective. When the target ship is end on, the torpedo, even when correctly aimed to hit, frequently glances off without exploding (bow wave and wake currents assist this deflection), or if it does explode fails to do much damage. [Germany evidently practiced caution both with her torpedoes and with her submarines. Torpedoes were so expensive, the supply was so limited, and the U-boats themselves were so precious that every effort was made to avoid risk of failure and destruction.]

It is thus seen that submarine tactics are not altogether simple. If the target ship is fast, steers zigzag courses, keeps a bright lookout, carries guns, and is also attended by escort ships specially equipped for destroying submarines, the difficulties in the way of successful attack are considerably increased.

The problem facing the submarine Captain may be summarised as follows:

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Keeping in mind the importance of safeguarding his own ship and also the necessity of economising in both fuel and torpedoes, he first studies the situation and if he is in a favourable position ahead of his quarry, he decides to attack. Assuming that the approaching vessel is armed he submerges before there is likelihood of discovery. He then observes at more or less frequent intervals through his periscope, takes bearings of the approaching target ship, and estimates her course, distance, and speed. His purpose is to avoid discovery and at the same time to manœuvre into a favourable position for launching at about one thousand yards' range a torpedo so aimed and adjusted as to strike the enemy ship at an angle of incidence to her fore and aft line greater than thirty degrees.

There are, of course, any number of variations in the methods of making a submarine attack, but as an illustration, suppose a U-boat submerged and approaching from a bow bearing at a speed of six knots toward a target ship advancing at twelve knots. (With good glasses a periscope can be distinguished in comparatively smooth water by an alert lookout at 3,000 to 4,000 yards.)

As the ship can probably escape by manœuvring if the periscope is seen before the torpedo is fired, it follows that the critical time for both the

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attacker and the attacked is during the interval of approach from the range of 4,000 yards to the firing range of about 1,000 yards. This interval will last on an average from seven to ten minutes, depending upon the speeds, upon the angle of approach and upon how accurately the submarine judges the course of the target ship. Beginning at 4,000 yards the submarine can be expected to show about one foot of periscope and observe for a period of about thirty seconds. After this four or five successive observations will probably be taken at intervals of about one minute, the period of time that the periscope is exposed diminishing gradually to ten or twelve seconds.

In the meanwhile the submarine will have closed to about 2,000 yards, and from now on only a few inches of periscope will be exposed, but at more frequent intervals, about every thirty seconds, and the length of time the periscope is shown will decrease to from ten to five seconds.

At about one thousand yards the firing exposure will be made, and this will probably be for about twenty-five seconds in order to assure a well-aimed torpedo.

The above procedure is not absolute—some submarine commanders show more periscope in attacking and others less—but it may be taken as typical. This means that in an average attack

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from the time the submarine can be seen to the time the torpedo is fired about ten minutes elapse, during which there are about fifteen exposures of the periscope for gradually diminishing periods of time, ranging from thirty seconds down to five seconds, except the last exposure for firing, which lasts about twenty-five seconds.

There has been some talk of a German invention designed to enable a submarine to make a successful approach and attack without showing any periscope. It is improbable that any such device is in general use at present.

Anti-submarine tactics may be divided into three general classes—first, tactics to *detect* and to *locate;* second, tactics to *destroy;* and, third, tactics to *evade.* Tactics to detect and to locate include all manner of lookout systems installed in ships and aircraft, underwater listening devices known as microphones or hydrophones, and intelligence reports from home and foreign information agencies by which probable positions of enemy submarines are plotted from day to day together with conjectures as to their future movements. Tactics to destroy include the use of depth bombs, mines, guns, nets, and the ram. Tactics to evade include the use of smoke screens made by smoke boxes, smoke funnels and the like, zigzag tactics, quick manœuvring in the presence of

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a submarine to frustrate attack or dodge the torpedo, and logistic calculations by which information of all sorts is collated and utilised to keep convoys clear of areas known to be dangerous.

Although these three classes of anti-submarine tactics are closely related and interdependent, for the sake of clearness they will be briefly discussed separately and in turn.

TACTICS TO DETECT AND TO LOCATE

The lookout system is the most important part of the submarine defence of a large ship. Everything depends on first seeing the periscope or the torpedo in time, and then transmitting the information quickly and accurately to the ship control and fire-control stations so that the attack may be thwarted by prompt manœuvre and gun fire supplemented by the use of depth bombs, smoke screen, or other expedient, according to the circumstances. The organised submarine lookout system for capital ships comprises a large number of lookouts stationed both aloft and below. The horizon circle is divided into sectors, each consisting of a comparatively small arc numbered and assigned as an individual lookout station.

Each sector is covered by at least two lookouts and the more dangerous sectors on the beam are usually covered by three or more lookouts. The

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means of making reports from the lookout stations to the bridge and to the gun-fire control stations are designed to assure prompt and accurate transmission. The personnel is intensively trained both to develop skill in distinguishing objects in the water with the proper glasses provided and also to use judgment in making reports. Lookouts are frequently relieved, and great care exercised that the waters all around the ship are continuously swept day and night by alert lookouts. A ship can usually avoid attack if the submarine or even the torpedo is sighted when still far enough away to permit a radical change of course before the torpedo can travel the intervening distance. Safety depends upon "seeing," and an alert lookout by gaining 200 or 300 yards in sighting a periscope may avert destruction.

The advantage of altitude in maintaining a lookout for objects both above and below water is obvious. For this reason aircraft lookouts are widely used both in convoy and patrol work. These include the various types of aeroplanes, airships, observation kites, and observation balloons.

The ability of submarines to hide, together with conditions of choppy sea, fog, mist and failing light under which it is easier to see a big ship than it is to see a small periscope tend to handicap the lookouts. It has been endeavoured, therefore, to

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devise means of detecting the presence of the submarine by the sense of hearing. Water is a better conductor of sound than is the air, and before the war tests had shown that a submarine bell could be heard with the receivers installed on board ship ten miles away when the vessel was in motion, and up to twenty-one miles with engines stopped. William Dubilier, an American electrical engineer, devised a harbour defence system against U-boats which he has explained as consisting of a number of special microphones arranged at a certain depth around the entrance of the harbour, each microphone accurately faced in a known direction. The operator by slowly shifting the contact of his receiver from one microphone to another can note the one in which the sound of the submarine is loudest and so report the direction of the enemy at that time. The French naval authorities had a school for the sole purpose of training men to listen for the sounds of submarines by means of hydrophones. The operator was stationed in the utter quiet of a padded cell with his ear receiver connected to a series of diaphragms, so sensitive as to record the passage of a submarine at a considerable distance, and also roughly indicate the direction in which it might be travelling. It is obvious that the perfection of such means for detecting and locat-

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ing submerged submarines constitutes an important step toward rendering commerce destruction by underwater craft a dead issue.

TACTICS TO DESTROY

To defeat a submarine campaign against commerce, successful tactics to destroy, to harass, to make the submarine hunted as well as hunter, are essential both to lessen the numerical strength of the enemy and also to damage his morale.

The gun is chiefly useful to compel a submarine to keep submerged and use torpedoes at a disadvantage. While it is difficult to hit a periscope, and even if a lucky hit is scored no serious damage is done as spare periscopes are carried, still, the presence of the gun is important both to embarrass attack and also to menace the submarine should she for any reason be forced to come to the surface.

The usual service shell fired by naval guns at comparatively short ranges are deflected upwards on striking the water and ricochet. In order to get a shell to dive and follow an underwater trajectory to reach the submerged U-boat, a non-ricocheting type was developed. These plunging shell are somewhat similar in their operation to depth bombs and render gun-fire more danger-

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ous to submarines. It may be supposed that such shell kept falling just short of a periscope and so fused as to burst both on contact and at a certain depth make it uncomfortable for an attacking U-boat.

Under ordinary circumstances most submarine skippers would not consider it wise to risk a gun engagement on the surface. The policy of arming merchantmen together with the convoy system has created conditions under which surface attack has to be made in the face of effective gun-fire. This greatly reduces the usefulness of the larger type of commerce-destroying submarine cruisers which, because of their size, are unhandy for making submerged attack. Torpedoes, moreover, are expensive and cannot be carried in large numbers. On the whole it may be concluded that the gun is an important factor in anti-submarine tactics.

An under-water weapon is needed to attack an under-water enemy. Mines and depth bombs are, therefore, very useful against submarines. The depth bombs, variously known as depth charges or water bombs, are designed to be dropped over the stern of a ship or thrown in pairs simultaneously to a distance on either side of the vessel by means of a specially designed depth bomb thrower known as a "Y" gun. These bombs are fitted with an hydrostatic valve operated by the

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weight of water so that the charge explodes at the depth to which the valve is set. In order to do damage these charges do not have to be exploded against the hull of the submarine, but are made so large and powerful (300 to 600 lbs.) that when exploded at some distance away the concussion is sufficient to blow in the sides of the submarine or to disarrange the delicate and complicated internal machinery and fittings. The presence of a submarine being evidenced by sighting a periscope or a torpedo its location at the particular time is approximated as accurately as possible and marked. The destroyers and other anti-submarine craft in the vicinity then proceed to lay a scientific depth bomb barrage covering the locus of all points the submarine could reach in the elapsed time. A bombed submarine may be destroyed and sunk, or it may be so damaged as to be forced to come to the surface and surrender; or it may succeed in limping home, or in reaching a neutral port for internment. Even when no material damage is suffered the effects of being bombed are damaging to the morale of the crew.

Early in the war nets were used to good purpose, but after a time the submarines were fitted with net cutting devices and learned to negotiate with fair success this type of defence. Besides

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channel nets and harbour nets a type of drag net was used. This net has been described as being of wire with a fifteen-foot mesh cut into lengths of one hundred and seventy feet with a depth of twenty-seven feet. To the top edge of this netting large wooden buoys were lashed. Destroyers or patrol boats with good speed operated in pairs to handle these nets, sections of which were suspended between them. A periscope being sighted and the course of the submarine estimated, the two vessels with the drag net between them would steam ahead of the submarine and then cut away the lashings holding the net so that the enemy U-boat would steer into it and become entangled. The buoys marking the net would thus be towed along by the submarine and indicate her position so that she could be destroyed by depth bombs or other means. Submarine sweeps have also been described as consisting of powerful explosives towed at a certain depth and set to explode on contact. Various kinds of nets are useful for harbour defence and against the smaller types of submarines in shoal waters, but are not of much value against the ocean-going submarine cruisers.

The use of so-called "Q" ships or mystery ships comprise an interesting phase of anti-submarine warfare. The service of these require both cour-

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age and skill. A mystery ship may be defined as a naval submarine destroyer disguised as a merchantman. The usual type is a merchant ship, mounting carefully concealed guns and manned by a trained naval crew dressed in civilian clothes. The object is to decoy the enemy submarine into easy range and then suddenly unmask the guns and destroy her by rapid and accurate gun-fire before she has a chance to submerge. As an example, suppose that a "Q" ship, loaded with lumber so that she will not sink, puts to sea and is torpedoed. At once "panic" parties including men dressed as women scramble into the ship's lifeboats, launch them with much confusion and hastily row away, giving the idea that all hands are abandoning the ship in great terror. Then when the submarine approaches the apparently deserted ship with a view to looting her the hidden crews unmask their guns and open fire. As the methods of the mystery ships become known to the enemy, however, submarines learn to be cautious, and successes by these tactics decrease in number.

Concurrent with improvements in methods for detecting and locating submarines, together with the development of means for destroying them, there has been extension in the use of restrictive mine fields. The diagram shows the mine fields

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in the North Sea as reported at the close of the war. The first to be laid protected the mouth of the Thames and also helped block the English Channel. Another one extending from the neighbourhood of the Dutch Coast to that of Denmark enclosed the waters of Heligoland Bight and was laid early in 1917. The third field, obstructing ocean passage from the North Sea around Scotland, extended between the Orkneys and the Norwegian Coast. This was reported as covering an area of about 12,758 square miles. During the summer of 1918 the efficiency of anti-submarine mine barrages in the North Sea was greatly increased. The United States Navy equipped a large mine fleet which took an important part in this work which contributed so effectively to overcoming the U-boat.

Up to April, 1917, no mine had been developed suitable for blocking the North Sea across the Scotland-Norway line where the depths of water are as great as nine hundred feet. To restrict the enemy submarines it was necessary to mine this line from the surface to the depth of two hundred and fifty to three hundred feet. The Bureau of Ordnance of the United States Navy Department submitted a plan for laying this barrage with a new type of mine. As a result, 100,000 mines were manufactured by the United

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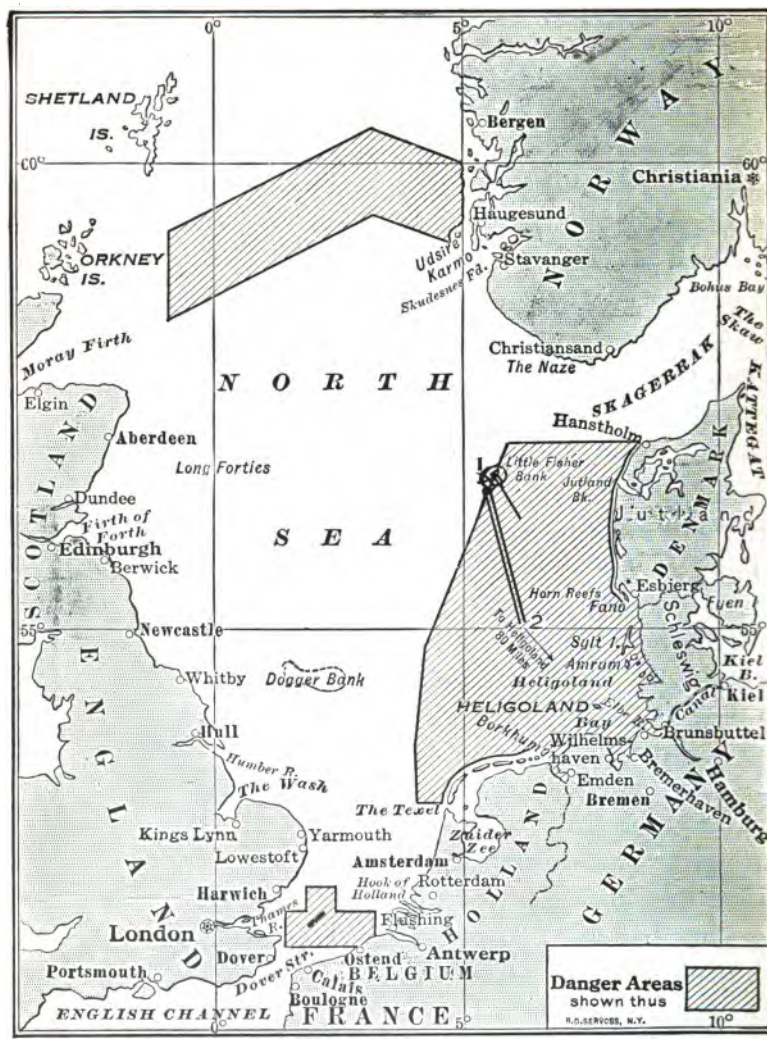

MINE FIELDS LAID BY BRITISH AND AMERICAN NAVIES IN THE NORTH SEA
(Diagram of the Battle of Jutland is also included)

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States, of which 85,000 were shipped abroad. Eighty per cent. of the Scotland-Norway mine barrage was laid by the United States Navy. The total personnel engaged numbered 6,700. Results obtained justified the effort and cost expended.

TACTICS OF EVASION

The primary objective of anti-submarine tactics is to destroy the enemy submarines. But, since it is easier and wiser for the larger vessels, transports, and merchantment to evade the attack, every effort should be made by them to practise tactics of evasion to supplement tactics to destroy. In convoy the latter can much better be conducted by the escorting destroyers.

Zig-zag tactics make attack difficult. Also, a quick manœuvre the instant a periscope or torpedo is sighted will often save the ship. Alert seamanship is, therefore, a main reliance of capital ships in avoiding submarine attack.

It may be mentioned here that at the start of Germany's unrestricted submarine campaign against commerce it was extremely hard to control merchantmen and get them to practise simple anti-submarine tactics—such as steering zigzag courses—calculated to embarrass the submarine in the accomplishment of its purpose. It was difficult for seamen who for years had navigated the

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usual lanes to understand and carry out instructions intended to safeguard them from a foe they could not see. When the tangible proof of the enemy's presence arrived it was too late. Utmost vigilance was necessary at all times, and in the early stages of the war the percentage of torpedoed ships was not sufficiently high to spur the crews to great exertions.

There were many influences inclining the individuals on board ships passing through the war zone to the opinion that getting safely by was largely a question of luck. There seemed to be more or less prevalent a sort of fatalistic attitude toward the submarine, or the gambler's attitude of taking a chance against being torpedoed, with a resulting laxity in the observance of safeguarding measures. Whatever the cause of this indifference to the practice of simple anti-submarine tactics of evasion, there is plenty of evidence that many a ship played into the hands of the U-boat either by failure to carry out instructions, or by a poor lookout system, or by neglect to steer zigzag courses before sighting the submarine. This was unfortunate, but not surprising. The nature of the submarine enemy was such that to combat it successfully required a personnel well trained and well disciplined. The extension of the convoy system strongly advocated by the

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United States Navy resulted in a closer observance of safeguarding measures and in many ways contributed to the defeat of the U-boats.

A smoke screen has also been found useful to enable merchantmen to escape in cases where they are not sufficiently well armed to repel the gun attack of submarines manœuvring on the surface of the water. These screens may be made by escorting destroyers, or by smoke boxes thrown overboard, or by smoke funnels mounted at the stern filled with a phosphorous compound which when lighted emits a dense black smoke so heavy that it hangs over the surface of the water. It is claimed that the clouds produced by these smoke boxes and funnels will be effective for six hours under usual weather conditions.

In order to evade and to confuse enemy submarines wide use has been made of camouflage painting of hulls and exterior fittings of all types of ships. On January 12, 1918, however, the British Admiralty issued a statement to the effect that "the theory of rendering ships invisible at sea by painting them various colours is no longer tenable, and that the numerous schemes tried by the Admiralty under actual conditions at sea have invariably been disappointing."

It is generally understood that a scheme of camouflage painting which renders a ship more

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difficult to see under certain light conditions may render the ship more easy to see under other light conditions. Experience seems to indicate that the standard Navy gray for all conditions is as serviceable for concealing the presence of the ship as

A CONVOY SHOWING ESCORT AND AN EXAMPLE OF "DAZZLE" PAINTING

any colour or scheme of colours so far devised. The so-called dazzle painting, however, has demonstrated usefulness as a means of making an accurate estimate of course and speed difficult.

The convoy system combines all three classes of anti-submarine tactics, and by bringing ocean traffic under control renders the work of the commerce-destroying submarine much more difficult.

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The attacking submarine must reckon with the naval escort and risk destruction in approaching the convoy. The make-up of the convoy and escort depends on varying conditions. In so far as availability of ships and readiness for sailing permit the convoy is formed with a view to homegeneity in speed so that fast vessels may not be held back by slow ones. Cruisers act as ocean escorts to guard convoys from enemy raider attack, and submarine cruisers operating on the surface, to supervise generally, and to stand by in readiness to act in any emergency. In submarine danger waters the convoy is surrounded by escorting destroyers, yachts, or submarine chasers of other type and frequently attended by aircraft. The strength of the escort varies according to the value of the convoy and the number of submarines supposed to be operating in the vicinity. No fixed rule can be laid down as the naval vessels available must be distributed in such manner as will best meet the requirements of the moment.

The disadvantages of the convoy system are increased likelihood of collision, reduction of speed to that of the slowest ship, and improved chances that a submarine may score a lucky hit at long range. These, however, are outweighed by the advantages as is attested by results obtained.

Seagoing craft of all descriptions approach-

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ing the characteristics of the destroyers and capable of carrying guns and bombs are useful. Yachts, fast tugs, and other comparatively small vessels capable of keeping the sea and making reasonable speed can all do good work in the war zone. Torpedo boats and the smaller submarine chasers and patrol boats, though not so useful as more seaworthy vessels, are still of value for operating nearer the shore. Mine sweepers also are needed.

Seaplanes, dirigibles (Blimps), and kite balloons make good scouts because of the large areas they can cover. Weather conditions are seldom such that submarines entirely submerged can be seen by aircraft, but this does not make the latter less valuable for detecting periscopes and submarines awash or on the surface. Also aircraft mark the spot where a periscope is sighted and so assist destroyers and patrols in the effective use of their bombs.

Cruisers and converted cruisers are needed for distant convoy work, to carry seaplanes, to carry kite balloons, and also for various administrative and mothership duties.

An anti-submarine force, therefore, includes cruisers, converted cruisers, destroyers, submarines, torpedo boats, patrol craft, mine sweepers,

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seaplanes, dirigibles, and kite balloons, all supplied in as large numbers as can be obtained.

In the last year of the great war as the German submarine crews learned by hard experience of the increasing number and variety of schemes used to destroy them they began to realise that the chances were against them. This in itself was a restraint, which made the U-boats more wary and consequently less effective. At best there was not much comfort or security in a long submarine cruise. The prospect of dying like a rat in a trap was not pleasant, whether because of accident, or shipwreck, or hostile attack. The strain of constant guard against the devices of an alert enemy told on even the strongest nerves. Each new method or contrivance which increased the anxieties and difficulties of the U-boats proved helpful in checking their activities, and often contributed in unexpected ways to their destruction.

The submarine menace was very real. Facts and figures show that it was one of the most important problems of the war. But anti-submarine tactics were developed right along, and, while the U-boat as a lawless commerce destroyer was unforeseen and countermeasures consequently not prepared during previous years of peace, still, at no time was there any real doubt but that it would be successfully met by the Allied navies.

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CHAPTER XI

United States in the War

Overseas Transportation of United States Troops.

PREVIOUS to 1917 the idea of a United States overseas expeditionary force numbered by millions would have been generally regarded as a remote if not impossible contingency. Consequently no extensive peace-time preparations had been made for such an undertaking. The task of providing a transport fleet was, therefore, a pioneer work. Ships had to be obtained, officers and crews enrolled and trained. It was necessary to provide docks, storehouses, lighters and tugs, coaling equipment, repair facilities, and all the varied machinery for operating and maintaining a large transportation service. An efficient administrative organisation had to be developed.

The work of the navy in connection with the transportation of troops to France constitutes a distinct phase of the present war. The attending political and military circumstances incident to the collapse of Russia, the critical situation on the western front, and the threat of the German

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submarine combined to make this phase of special significance. Throughout the year following the entry of the United States into the war the military and naval developments were such that the safe transportation across the Atlantic of troops and supplies became a problem of more and more pressing importance.

Such, in brief, was the problem confronting Rear Admiral Albert Gleaves, then Commander of the Destroyer Force of the Atlantic Fleet, when, on May 29, 1917, he received orders designating him Commander of United States Convoy Operations in the Atlantic in addition to his other duties.*

The United States Army in France was a decisive factor in obtaining speedy victory. The transportation of this army overseas under naval protection was, therefore, a major operation of first importance. A large share of this urgent mission devolved on the United States Navy, and its successful accomplishment in the face of great difficulties is another page to the record of the service in keeping with its past history and traditions.

The vast work of transporting a United States Army numbering 2,079,880 souls to Europe was not done by the United States Navy unassisted.

*At the close of the war, in recognition of his services, Rear Admiral Gleaves was promoted to the rank of Vice Admiral.

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Help was received from many quarters and the different organisations concerned performed their respective functions in utmost harmony and co-operation.

At the time the United States entered the war the enormous toll of shipping gathered by the U-boat in the East Atlantic and the boast of von Hindenburg that the submarine blockade of England would starve her out and win the war, indicate the seriousness of the naval situation in those waters at that time. Inasmuch as the principal field of British naval activities was the North Sea and English Channel, the task of breaking the U-boat blockade in the Atlantic naturally became the immediate mission of the United States Navy. The prompt despatching of destroyers, yachts, and all other available craft of a type useful against the submarine to the East Atlantic, and the splendid work these vessels did in cleaning up these waters of U-boat devastation is a matter of record, the importance of which in winning the war is conceded from all quarters. This was the first step in preparation for sending the United States Army overseas.

The next step was the development of the transport service and the convoy and escort system. In this work the Cruiser and Transport Force co-operated with the destroyers and other anti-submarine

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craft abroad. In addition, Great Britain, France, and Italy supplied troop ships. As would be expected from Great Britain's enormous merchant marine, she was able to supply the greatest carrying capacity. She had the ships ready for this use, and 48¼ per cent. of the American Army was transported in British steamers; 2½ per cent. was carried in French ships, and 3 per cent. in Italian. The remaining 46¼ per cent. were carried in United States ships, and all but 2½ per cent. of these sailed in United States naval transports.

All the troops carried in United States ships were escorted by United States men-of-war; that is, cruisers, destroyers, converted yachts, and other anti-submarine craft. Also for the most part the troops carried in British, French, and Italian ships were given safe conduct through the danger zones by United States destroyers. Roughly, 82¾ per cent. of the maximum strength of the naval escorts provided incident to the transportation of United States troops across the Atlantic was supplied by the United States Navy, 14⅛ per cent. by the British Navy, and 3⅛ per cent. by the French Navy. The Army organised and developed an efficient system for loading and unloading the ships at the terminal ports. The navy transported the troops and safeguarded them en route.

The declaration of war with Germany found

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the United States without a transport fleet and without a merchant marine capable of supplying ships for transporting a large military expedition. Starting with almost nothing at the beginning of the war, a United States naval transport service was built up which numbered at the time of the armistice, twenty-four cruisers and forty-two transports, manned, exclusive of troops carried, by about 3,000 officers and 42,000 men. This force carried almost a million soldiers to Europe without the loss of a single soldier by the hand of the enemy.

On homeward-bound voyages, the Cruiser and Transport Force was not as fortunate as on the East bound trips. In a measure this was due to need of concentrating maximum naval escort protection on troop-laden convoys. Frequently this necessitated lighter escort for the ships returning, and it was on these homeward-bound vessels that the submarines scored their successes. The United States Naval Transports *Antilles*, *President Lincoln*, and *Covington* were torpedoed and sank. The *Finland* and *Mount Vernon* were torpedoed, but were able to reach port for repairs. The United States armoured cruiser *San Diego* struck a mine laid by a German submarine and sank.

The service was not without hazard, as is shown by the casualties suffered. "Nor were enemy

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TABLE SHOWING TOTAL OF UNITED STATES TROOPS TRANSPORTED AND THE SHIPS THAT CARRIED THEM

Prepared by Ensign WALTER LOGAN, U. S. N., Statistical Officer, Cruiser and Transport Force, United States Atlantic Fleet.

1917	Carried by United States Naval Transports	Number of United States Naval Transports Sailed	Carried by British Ships	Number of British Ships Sailed	Carried by British-Leased Italian Ships	No. of British-Leased Italian Ships Sailed	Carried by Other United States Ships	Number of Other United States Ships Sailed	Carried by Other Ships (French, Italian, &c.)	Number of Other Ships Sailed (French, Italian, &c.)	Total United States Troops Transported	Total Ships Sailed	Percentage Carried by United States Naval Transports	Percentage Carried by British Ships	Percentage Carried by British-Leased Italian Ships	Percentage Carried by Other U. S. Ships	Percentage Carried by Other Ships	Under United States Naval Escort	Under British Naval Escort	Under French Naval Escort	Percentage Under U. S. Naval Escort	Percentage Under British Naval Escort	Percentage Under French Naval Escort
May.....	0	0	508	2	0	0	1,035	3	0	0	1,543	5	67	33	0	0	0	258	1,285	0	17	83	0
June.....	8,855	9	1,080	1	0	0	5,156	8	0	0	15,091	18	59	6½	0	34½	0	15,032	59	0	90	1	0
July.....	5,281	8	7,299	6	0	0	0	0	296	1	12,876	15	41	57	0	0	2	10,063	2,566	247	78½	20	1½
Aug.....	4,310	6	11,390	7	0	0	1,109	2	2,094	2	19,403	17	22	61	0	6	11	12,259	4,129	3,015	63	21	16
Sept.....	13,917	15	19,671	12	0	0	0	0	0	0	33,588	27	41	59	0	0	0	17,432	12,898	3,258	51½	39	9½
Oct.....	25,098	14	13,013	9	0	0	0	0	1,916	1	40,027	24	62½	32½	0	0	5	36,893	3,134	0	92½	7½	0
Nov.....	9,988	9	10,669	7	0	0	1,235	2	1,830	1	23,722	19	41½	46	0	4½	8½	13,246	10,476	0	56½	43½	0
Dec.....	37,445	16	11,370	9	0	0	0	0	0	0	48,815	25	77	23	0	0	0	42,783	6,032	0	87½	12½	0
1918.																							
Jan.....	25,662	16	20,514	9	0	0	0	0	1,879	1	48,055	26	53	42½	0	0	4½	35,827	12,228	0	75	25	0
Feb.....	39,977	17	9,259	4	0	0	0	0	3	1	49,239	22	81½	18½	0	0	0	48,795	444	0	99	1	0
Mar.....	56,278	26	27,626	14	0	0	1	1	1,895	4	85,710	45	65	33	0	0	2	73,095	12,615	0	85	15	0
Apr.....	67,553	27	47,362	20	2,626	2	737	11	1,794	3	120,072	63	56	39½	2	1	1½	91,308	28,764	0	75½	24½	0
May.....	96,273	33	133,795	75	12,127	6	3,288	22	2,231	5	247,714	141	39	53½	5	1½	1	220,463	26,652	599	88½	11	½
June.....	115,256	36	140,172	70	14,465	7	6,003	11	4,538	4	280,434	128	41½	50	5	2½	1½	244,631	30,912	4,891	87½	11	1½
July.....	108,445	33	175,526	89	11,502	7	4,020	13	11,866	5	311,359	147	35	50½	3½	1	4	258,332	46,329	6,698	83	15	2
Aug.....	116,401	36	137,745	74	9,376	6	8,495	15	14,358	9	286,375	140	41	48	3	3	5	237,920	22,572	25,883	83	8	9
Sept.....	107,025	35	134,576	69	7,052	4	5,511	18	5,506	3	259,670	129	41	52	3	2	2	224,298	20,681	14,691	86	8	6
Oct.....	72,092	43	94,214	57	11,098	7	4,709	17	1,950	3	184,063	127	39	51	6	3	1	130,274	51,454	2,335	70½	28½	1
To Nov. 11	1,191	9	10,698	12	0	0	235	3	0	0	12,124	24	10	88	0	2	0	7,451	4,673	0	61½	38½	0
Total..	911,047	388	1,006,987	546	68,246	39	41,534	126	52,066	43	2,079,880	1,142	43½	48½	3	2½	2½	1,720,360	297,903	61,617	82½	14½	3½

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guns and torpedoes the only menace—danger from fire and internal damage was enhanced by the machinations of enemy secret agents, and the likelihood of collision was increased by the necessity of manœuvring without lights in convoy formation vessels manned for the most part by inexperienced crews." [1]

In connection with the successful operation of these ships special mention should be made of the volunteer and reserve personnel, particularly the officers and men from the United States merchant marine service who enrolled in the navy for the period of the war.[2] These rendered splendid service, and the interests of the United States for the future require that the cordial relations of co-operation established between the merchant marine and the navy be maintained.

[1] Quoted from the General Report of the Secretary of the Navy.

[2] In the larger transports it was the policy of the department to have the captains, executive officers, chief engineers, gunnery officers, senior medical officers, and senior supply officers detailed from the regular navy and the remainder of the officer complement filled from the various classes of reserve and volunteer officers. This worked very well, and too much credit cannot be given the latter for the loyal service rendered and the aptitude shown in adapting themselves to naval war conditions.

In special cases it was possible, after a certain amount of experience had been gained, to relieve heads of departments, originally assignments of regular naval officers, by reserve officers. For example, in the case of the *Harrisburg, Louisville, Plattsburg, Manchuria, Mongolia,* and *Finland,* after a few trips the reserve captains took over command of the ships.

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OTHER WAR ACTIVITIES OF THE UNITED STATES NAVY

Excerpts quoted from the Annual Report of the Secretary of the Navy, December, 1918.

OPERATIONS—AT HOME AND ABROAD.

The operations of our Navy during the world war have covered the widest scope in its history. Our naval forces have operated in European waters from the Mediterranean to the White Sea. At Corfu, Gibraltar, along the French Bay of Biscay ports, at the English Channel ports, on the Irish coast, in the North Sea, at Murmansk and Archangel, our naval forces have been stationed and have done creditable work.

Naval men have served on nearly two thousand craft that plied the waters. On the land, marines and sailors have helped to hold strategic points, regiments of marines have shared with the magnificent Army their part of the hard-won victory, a wonderfully trained gun crew of sailors have manned the monster 14-inch guns which marked a new departure in land warfare. In diplomacy, in investigation at home and in all parts of the world by naval officers and civilian agents, in protecting plants and labor from spies and enemies, in promoting new industrial organizations and enlarging older ones to meet war needs, in stimulating production of needed naval craft—these are some of the out-standing operations.

THE INCREASE OF THE NAVY.

In 1912 there were 3,094 officers and 47,515 enlisted men in the Navy. By July 1, 1916, the year previous to our entrance into the war, the number had grown to 4,293 officers and 54,234 enlisted men. On July 1, 1917, three months after the declaration of war, the number of officers had increased to 8,038—4,694 regu-

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lars, 3,344 reserves; and the number of enlisted men to 171,133—128,666 regulars, 32,379 reserves, 10,088 National Naval Volunteers. The increase since that time is shown below:

April 1, 1918:	Officers.	Men.
Regular Navy—		
Permanent	5,441	198,242
Temporary	2,519	.....
Reserves	10,625	85,475
Total	18,585	283,717
Nov. 9, 1918:		
Regular Navy—		
Permanent	5,656	206,684
Temporary	4,833	.....
Reserves	21,985	290,346
Total	32,474	497,030

TEAMWORK AT HOME AND ABROAD.

Throughout its enormous expansion since the beginning of the war, the enlarged naval force has kept this vital factor—teamwork—always in mind. The Navy at home has shown its capacity for teamwork in cooperating with the Army, the War Industries Board, and the many other governmental activities already established and the new ones wisely created for the successful prosecution of the war. Abroad, the American Navy has given a demonstration, which can be characterized only as wonderful of its readiness to join with our associates in teamwork for the common end and the common good. In the Mediterranean, the Atlantic, the Pacific, and the Arctic; with England, with France, with Japan, with Italy, and all allied nations, the United States navy has cooperated without friction, looking always to the end to be attained.

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SEVENTY-FIVE THOUSAND MEN OVERSEAS.

War was declared on April 6, 1917. On the 4th of May a detachment of destroyers was in European waters. By January 1, 1918, there were 113 United States naval ships across, and in October, 1918, the total had reached 338 ships of all classes. At the present time there are 5,000 officers and 70,000 enlisted men of the United States Navy serving in Europe, this total being greater than the full strength of the Navy when the United States entered the war.

NAVAL BASES ABROAD.

In order to efficiently cooperate with our allies, United States naval port officers have been stationed at 20 of the principal seaports of Great Britain, France, and Italy. Fifteen naval bases have been established.

In connection with aviation, two repair and assembly bases, 4 kite balloon stations, 18 seaplane stations, 5 bombing plane stations, and 3 dirigible stations have been established and manned with Navy personnel, which includes 624 officers, 97 observers, and over 15,000 enlisted men.

The destroyers upon their first arrival were based on Queenstown which has been the base of the operations of these best fighters of the submarines during the war. Every facility possible was provided for the comfort and recreation of the officers and men engaged in this most rigorous service.

When the submarine chaser flotillas were sent overseas it was decided to route them via the Bermudas and the Azores in order to get them across materially fit and with the personnel in fighting trim. Having formulated the plan of getting our chasers across, it was necessary to secure for them certain base facilities on the way over. To that end negotiations were entered into with the Portuguese whereby we received from them the use of a temporary base at Ponta Delgada in the Azores. This base was built up to such an extent that we were able to care for the needs of our small and other craft that

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might require the use of a base while passing to and fro across the Atlantic.

During the year the forces abroad have been increased by vessels of all types. The most valuable type of vessel abroad for operations against submarines is, of course, the destroyer. There has been a constant increase in the number of destroyers sent abroad since the declaration of war, and the number now operating abroad is twice as great as the number which were normally kept in commission during peace time. Of these, 25 per cent are new, having been built, commissioned, and dispatched abroad since the declaration of war. These little craft have performed their duties in a most efficient manner and at the same time have maintained themselves in a state of material readiness which is remarkable when it is considered that each destroyer during a period of three months averages about 20,000 miles cruising.

The fitting out and operation of the 110-foot submarine chasers has had a marked effect upon the submarine campaign both here and abroad. At the beginning of this year there were 38 of these submarine chasers in commission. There are now 406 submarine chasers in commission, of which 235 have been dispatched abroad and the remainder assigned to duty in home waters.

The problem of sending such a large number of these small vessels with a limited cruising radius across the ocean was one that required careful thought. A plan of sending these chasers in groups, convoyed by a fuel ship and fueling at sea, was finally adopted and was most successful. In connection with the operations of a group of these chasers in the Adriatic, the following cable has been received:

Italian naval general staff expresses highest appreciation useful and efficient work performed by United States chasers in protecting major vessels during action against Durazzo; also vivid admiration of their brilliant

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and clever operation, which resulted in sinking two enemy submaries.

The principal antisubmarine efforts were at first carried on by surface craft, but it was later realized that the submarine itself is the enemy of the submarine, especially when our enemy submarines are forced to work upon the surface, as they sometimes are. Therefore, it was decided to send certain numbers of our submarines to the Azores, to keep that base clear, and also to the coast of Ireland to operate from that general strategic area. So, first in 1917, and later in 1918, two groups of our submarines were dispatched across the water, and after a hard winter passage made their ports and have been operating from those localities ever since. Before our submarines had been dispatched abroad, the process of concentrating our reserves in these craft on our Atlantic coast, there to prepare for future contingencies, had been undertaken.

During the year numerous convoys of small craft have been towed or escorted abroad for the Army and for the Governments of our allies without any loss. These craft include barges, derricks, tugs, and submarine chasers. The safe despatch abroad of this miscellaneous craft through submarine-infested waters has been accomplished in a very satisfactory manner.

The employment of the fighting craft of the Navy may be summed up as follows:

THE ESCORTING OF TROOP AND CARGO CONVOYS AND OTHER SPECIAL VESSELS.

In the summer of 1917, the submarine problem having become so acute and the losses to merchant ships so great, it became necessary to adopt more effective methods of handling merchant shipping, in order that a greater degree of safety should be afforded. The system of convoying ships was adopted. While this slowed up shipping fully 20 per cent and increased the dangers

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of collision and other difficulties, experience has amply justified the wisdom of the policy. The convoy system, the adoption of which was suggested by President Wilson shortly after our entrance into the war, was applied to both cargo and troop ships and its success was almost immediately apparent. It consisted in gathering together certain numbers of vessels, sailing at regular intervals along established lanes, under the guard of heavier ships to protect against raiders, and destroyers to protect against submarines.

This system went into effect with the first of our troop convoys, which crossed in June, 1917, and has continued ever since, to the day the armistice was signed. It had much to do with breaking the back of the submarine offensive, for it deprived the U-boat of the benefit he derived from attacking individual, unprotected ships and forced him to devote his efforts, for the most part, to ships which were protected by destroyers. To engage with a convoy, the submarine was forced to enter the danger zone and frequently it was he and not our ships which became the victim.

In these convoys efforts, all of our destroyers, our armored cruisers, our smaller cruisers, and later the old battleships of our fleet, have been engaged, continuously, winter and summer. It has been hard, grinding work, but that it was well done is attested by the fact that two million troops were sent abroad, with not the loss by enemy action of a single east-bound ship carrying troops under the protection of our forces.

The history of the convoy operations in which our naval forces have taken part, due to which we have been able so successfully to transport such a large number of our military forces abroad, and so many supplies for the Army, is a chapter in itself. It is probably our major operation in this war and will, in the future, stand as a monument to both the Army and the Navy, as the greatest and most difficult troop transporting effort which has ever been conducted across seas. The work is not finished. The bringing of our forces back

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is still a naval problem, and it will be undertaken with the same spirit which characterized the transportation and convoy of our troops to Europe.

TROOPS TRANSPORTED—THE ROAD KEPT OPEN TO FRANCE.

Two million American fighting men have been safely landed in France. This is the record of the cruiser and transport force of the Atlantic Fleet of the United States and of the American troops carried by British ships, and some assistance from other allied ships.

From a small beginning at the outbreak of war—a few cruisers and hastily gathered together transports, the latter for the most part slow—the cruiser and transport force has been gradually expanded into a great fleet, now comprising 24 cruisers and 42 transports, manned by 3,000 officers and 41,000 men. These are augmented by 4 French men-of-war and 13 foreign merchant vessels, a grand total of 83 vessels. This entire force, under command of Rear Admiral Albert Gleaves, whose ability and resource have been tested and established in this great service in cooperation with the destroyers, converted yachts and other anti-submarine craft operating abroad, has developed an antisubmarine convoy and escort system the results of which have surpassed even the most sanguine expectations. The successful development of antisubmarine tactics in the Atlantic is an achievement of the United States Navy, the value of which it would be hard to overestimate.

Strategy has required the cruiser and transport force to operate with utmost secrecy. Convoy duty has not been spectacular, but it has demanded endurance, constant vigilance, and devotion to duty of the highest order under circumstances of the most trying and arduous nature. Too much credit can not be given to the officers and enlisted personnel who have accomplished this hazardous and responsible mission. Winter and summer they averaged approximately 70 per cent of the time at sea.

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Up to November 1, 1918, of the total number of United States troops in Europe, 924,578 made passage in United States naval convoys under escort of United States cruisers and destroyers. Since the 1st of November, 1917, there have been 289 sailings of naval transports from American ports. In these operations of the cruiser and transport force of the Atlantic Fleet not one eastbound American transport has been torpedoed or damaged by the enemy, and only three sunk on the return voyage.

Taking into consideration the dangers and difficulties attending the service of the cruiser and transport force, the comparatively light casualty list is eloquent testimony of an efficient personnel organized and trained under a wise administrative command.

Notwithstanding this, however, more than half of our naval casualties inflicted by the enemy have been suffered in the cruiser and transport force. These losses were to be expected in a service involving great hazard, not only from enemy guns and torpedoes, but also from the machinations of enemy secret agents and from navigational dangers enhanced by operating without lights under unfavorable conditions.

SOME ILLUSTRATIVE FIGURES.

As an indication of the work being done by United States naval vessels in the war zone, the following averages of miles steamed per month are given:

	MILES.
Destroyers	275,000
Miscellaneous patrol craft	120,000
Mine sweepers	10,000
Mine layers	10,000
Battleships and submarines	90,000
Submarine chasers	121,000

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or a total of 626,000 miles per month. The above figures include vessels actively engaged in naval duties only, under command of the force commander, United States naval forces in Europe, and not troop ships, transports, cargo carriers, or miscellaneous merchant vessels flying the American flag, constantly plying through the war zone. Nor does it include cruisers or battleships engaged in oversea escort duties.

DISTANCES STEAMED BY DESTROYERS.

Distances steamed by various destroyers can be shown when the record of several of the first to arrive in European waters is examined. Three of these are shown to have steamed during the first year of service in the zone:

	MILES.
U. S. S. *Porter*	64,473
U. S. S. *Conyngham*	63,952
U. S. S. *Davis*	63,015

An individual instance of activity is given for one of the new destroyers. The U. S. S. *Kimberley*, during the month of June, steamed 7,019 miles, and was at sea 470 hours during the month; i. e., about 65 per cent of the time.

TYPICAL ESCORT RECORDS.

During July and August, 1918, 3,444,012 tons of shipping were escorted to and from France by American escort vessels; of the above amount, 1,577,735 tons were escorted in and 1,864,677 tons were escorted out of French ports. Of the tonnage escorted into French ports during this time, only 16,988 tons, or 0.009 per cent, were lost through enemy action, and of the tonnage escorted out from French ports, only 27,858 tons, or 0.013 per cent, were lost through the same cause. During the same period, July and August of this year, 259,604 American troops were escorted to France by United States escort vessels without the loss of a single man through enemy

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action. The particulars in the above paragraph refer to United States naval forces operating in the war zone from French ports.

During the same time—July and August—destroyers based on British ports supplied 75 per cent of the escorts for 318 ships, totaling 2,752,908 tons, and including the escort of vessels carrying 137,283 United States troops. The destroyers on this duty were at sea an average of 67 per cent of the time, and were under way for a period of about 16,000 hours, steaming approximately an aggregate of 260,000 miles. There were no losses due to enemy action.

The American force based on Gibraltar, including destroyers, gun-boats, cruisers, yachts, and Coast Guard cutters during July and August, have been at sea 56 per cent of the time, and actually under way 15,500 hours, steaming during this period 160,000 miles. They have supplied approximately 25 per cent of the escorts for Mediterranean convoys between Gibraltar on the one hand and France and Italy on the other, and have performed 70 per cent of the ocean escort duties between Gibraltar and England. The above figures are given as indicative of what is accomplished month by month by our vessels in the war zone.

In addition to duty performed by destroyers and other escorting vessels, the extensive naval activities of our battleships with the British Grand Fleet, mining units, patrol units, submarine hunting, mine sweeping, salvage, etc., have been many and varied.

FUEL SUPPLY—PIPE LINE ACROSS SCOTLAND.

The coal used by the American Expeditionary Forces in France is carried to that country in vessels largely officered and manned by the Navy. Of the 70 or more ships operating in Army coal service two-thirds have now been commissioned in the Navy, and the others will shortly follow.

The destruction of tankers carrying oil to our own

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ships and the British fleet in the North Sea gave much anxiety, and in order to avert the submarine menace in sending the tankers around the north of Scotland it was determined by the American and British Navies to build a pipe line across Scotland. Our naval experts undertook the big task, and thereby reduced the distance and danger of supplying the fleet with oil.

NORTH SEA MINE BARRAGE.

The outstanding antisubmarine offensive project of the year was the closing of the North Sea by a mine barrage extending from the Orkney Islands to the territorial waters of Norway, together with a barrage across the Straits of Dover. The plan to close the North Sea, and thereby deny enemy submarines free access to the Atlantic from German bases, had its inception in the Bureau of Ordnance in April, 1917, immediately following the entrance of the United States into the war. At this time there had not been developed anywhere a type of mine suitable for the Scotland-Norway line, whereon the depths of water are as great as 900 feet and where a prohibitive number of mines of the then existing type would have been required to mine this line from the surface to a depth of 250 to 300 feet.

A memorandum covering the possibilities of the new mine was prepared, advocating the laying of a barrage consisting of mines of this type across the North Sea, and this was given to Admiral Mayo, then leaving for England, where the project could be discussed with the British Admiralty. As a result of his conference with the British authorities and of detailed information furnished them by British mining officers sent to this country, the Admiralty gave its approval to the scheme, and both Navies worked together in this big undertaking, more extensive and important than any mine barrage ever before considered, much less carried out.

The following facts show briefly the magnitude of the operation so far as the United States is concerned. One

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hundred thousand mines were manufactured, of which about 85,000 have been shipped abroad. Two new mine bases were established abroad, with a capacity for assembling and issuing 1,000 mines a day.

More than 50,000 American mines have been laid in strategical areas in European waters. The Navy has taken part in and actually laid 80 per cent of the great mine barrage, 230 miles long, from Scotland to Norway. A total of 56,439 mines have been laid, all of which were designed and manufactured by the United States and transported and laid by the United States Navy. The total personnel engaged in mining activity alone is upward of 6,700 men.

HUGE MINE-LOADING PLANT IN OPERATION.

A special mine-loading plant, with a capacity of more than 1,000 mines a day was established near Yorktown, Va., by the Navy Department, in accordance with congressional authorization, about 11,000 acres of land having been secured for the purpose.

An immense number of mines will be stowed at this depot, and it will include a mine-loading plant, a mine-assembling plant, and storage for a large amount of high explosives. In addition to this mine-loading depot, the mine-loading plants at the various ammunition depots have been operating successfully during the past year.

More than a score of cargo vessels were placed in service as mine carriers to transport mines to Europe. Many mine layers and several auxiliary vessels were fitted out and assigned to the execution of the North Sea project.

The manufacture of the large number of mines required was a work of unprecedented magnitude and necessitated unusual methods. It was clearly impossible, in the time available, to manufacture the mine as a whole in any plant; therefore the mine was divided into its many component parts and the parts were separately produced in a large number of industrial factories

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throughout the country. To show the extent of subdivision of work, 140 principal contractors and over 400 subcontractors were engaged. The parts were assembled into subassemblies in this country, and the subassemblies were shipped to Europe, where the complete assembly was made just prior to issue to the mine planters. By carrying out the work in this manner a gain of a full year was made in the planting of the barrage.

The military results already obtained from the barrage more than justify the effort and cost expended. The number of submarines sunk or disabled in the barrage probably will never be definitely known, since it is impossible to keep close observation continuously on a line 250 miles long, but ordnance officers report that there is reason to believe that at least 10 submarines had ended their career at the barrage before the middle of October.

THE ASSIGNMENT TO DUTY AND OPERATION OF NAVAL VESSELS TO INCREASE THE FORCE IN HOME WATERS.

During the year numerous smaller craft, including destroyers, torpedo boats, mine sweepers, submarines, and submarine chasers have been commissioned and assigned to the home districts for operating against enemy submarines and protecting coastwise shipping and for sweeping the channels and approaches to the coast. Action of enemy submarines in placing mines at focal points along the coast has required extensive mine-sweeping operations. This has necessitated the commissioning of new mine sweepers and the conversion of other craft which have been taken over for that purpose.

NAVAL DISTRICTS.

One of the agencies adopted during the war for more efficient naval administration is the organization and development of naval districts. In the efficient admin-

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istration of the large and diversified work carried on by the Navy, some method of grouping activity and decentralizing authority is essential. For the purpose of naval administration, the United States and its possessions have been divided into convenient subdivisions known as naval districts. The supervision of all naval activities in each of the districts has been placed under a commandant of the district, who is a naval officer of rank and experience. In this way the department has been able through the various commandants of districts to carry out problems involving patrol and defenses of the coast, mine sweeping, communications, information, industrial developments, housing facilities, commandeering vessels, etc.

THE NAVY THAT FLIES

Of untold importance during the year was the establishment and placement under operation of naval-air stations at all the strategic and important points on the coast of the United States. Likewise, a station was established in the Canal Zone. As a result of those activities, the larger part of the American coast has been constantly patrolled by naval aircraft. Furthermore, the Navy Department has already planned and is fully prepared to establish enough additional stations to so complete the system that every foot of the coast of the United States can be thoroughly and constantly patrolled. Many of the stations now in operation are equipped not only with seaplanes but also with dirigibles and kite balloons. The extent of activities that are being carried on can be readily illustrated. Thus, during June, 1918, a total of 25,642 flights, covering about 2,155,860 miles, were made by seaplanes at stations along the United States coast. These figures include both patrol and training. During that same period of time lighter-than-air craft made a total of 613 flights, covering about 56,420 miles.

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THE CARRYING OUT OF OFFENSIVE AND DEFENSIVE MEASURES AGAINST ENEMY SUBMARINES IN THE WESTERN ATLANTIC.

The wisdom of making a clean-cut line of demarcation between the military and industrial activities on our coast and of foreseeing the character of hostile operations against which we should make preparation was clearly shown when the enemy first directed his operations against our coast. About the middle of May, 1918, the enemy evidently decided that he must make an effort to stop us from sending more military forces abroad or at least to so distract our efforts that we should be more concerned with protecting our own coast than we were in forwarding troops.

When the submarines appeared off our coast, the policies already formulated were promptly put into effect. It had been determined before by the department that the logical military objective would be our troop and cargo convoys, but these were so well guarded that the submarine evidently preferred not to engage with them, but devoted his efforts against our coastwise trade, and principally against our unarmed sailing vessels. Along with this campaign of destruction, which had no military value whatsoever, the enemy adopted the practice of strewing our coast with mines. This feature of his campaign had been anticipated and our sweepers had been actively engaged in clearing the channels through which our convoys regularly sail. It was natural, however, with the long expanse of sea-coast which we had to protect, that the enemy should succeed in laying detached mine fields which more than once proved destructive to our coastwise shipping.

Up to the time that the U-boats appeared, it had been the practice to allow coastwise ships to sail direct, and as far as was practicable lights were burned and the ordinary aids to navigation were kept going.

Immediately upon their arrival in American waters, without in the slightest degree allowing the enemy's ef-

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forts to diminish the rate of flow of troops and supplies abroad, all coastwise shipping was hauled in close under the protection of our district forces and a series of routings, escort and air patrols were started which rendered reasonably secure the vessels that plied up and down our coast. In order to further render our shores secure, and to force the hostile submersibles to operate farther afield, our own submarines were immediately sent out against them. Hunting groups of destroyers and chasers, which had been formed and were in readiness, were put into action.

The net result was that very soon, from a military point of view, the hostile submarine's efforts became practically nil and he was forced to operate farther afield—that is, well out into the Atlantic, where his principal prey became the single unarmed ships returning home on their westbound voyages. This move on the part of the Germans had been anticipated, as for the greater part westbound ships rarely returned home singly, but usually in company with another craft which carried a gun sufficiently large to cope with that of the submarine. On the whole, the operations of German submarines against our coast can be spoken of as one of the minor incidents of the war, and had the enemy chosen to carry his operations into the Gulf, or even to the coast of Brazil, he would have found that preparations had been made to anticipate them.

THE PROTECTION OF VESSELS ENGAGED IN COASTWISE TRADE.

The appearance of enemy submarines in these waters necessitated the putting into effect of the convoy system for coastwise shipping and for the protection of individual ships engaged in the coastwise trade. This has been accomplished in accordance with the previously made plans and has worked smoothly, the protection to shipping being afforded by the craft assigned to naval districts.

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PROTECTION OF OIL SUPPLIES FROM THE GULF.

To forestall enemy submarine operations in the Gulf and Caribbean, a force was established called the American Patrol Force, and its headquarters was in the vicinity of Key West. While the coastwise shipping could be adequately protected by routing close along our coast, the problem became a different one the instant it entered the Gulf and Caribbean areas, and it was this problem and the problem of antisubmarine operations which the American patrol detachment had to undertake. As was foreseen, the protection of the oil supplies from the Gulf to our own coast and then abroad were quite vital to the success of the general campaign, and these supplies the patrol detachment was prepared to safeguard by adopting at once the convoy system the instant they were threatened.

COAST GUARD—ITS WORK WITH THE NAVY.

Upon the declaration of the existence of a state of war, the Coast Guard, pursuant to the provisions of act of Congress approved January 28, 1915, entered at once upon its war-time duties as a part of the Naval Establishment. Plans for the mobilization of the service and its operation as a part of the naval forces in the contingency of war had already been formulated, so that the transition from its peace-time uses was effected with the minimum of disturbance. The vessels and stations were assigned to the various naval districts and fleets where their services could be used to the best advantage. A number of the cruising cutters were equipped with more effective batteries and assigned to patrol duty in the submarine zone. Others were placed on the coast patrol and given various naval duties in home waters. The crews of Coast Guard stations have been increased in number and a vigilant and extended patrol of the beaches maintained day and night.

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ENTIRE COAST CONNECTED BY WIRE.

The communication service maintained between stations has been extended so as to embrace all stations along the Atlantic coast and a number of outlying lighthouses and light vessels. This system comprises 2,327 miles of land line and 402 miles of submarine cable. Through this instrumentality our entire Atlantic seaboard is kept in instant and constant touch with Washington, the various headquarters, and other important centers. The system has proved of incalculable value to the Navy in time when attacks have been made by the enemy off our coast and the presence of enemy craft has been suspected. It is also serving a useful purpose in aiding and directing instant and personal communication between commanding officers and the various units, thereby facilitating action in urgent and important matters.

Much ammunition and high explosives shipped abroad in connection with the war have been forwarded through the port of New York. The safe handling and loading of such vast quantities of explosives in this congested harbor have demanded and received the most careful and untiring efforts. This work has been largely entrusted to officers and men of the Coast Guard, and it is gratifying to note that there has not been a single accident or mishap connected with this vast undertaking, either in the harbor of New York or on other navigable waters, during the period of the war.

SAVING LIVES AND PROPERTY

While the various units of the Coast Guard are used in the war-time duties of the hour, on many occasions they are and have been able to render effective aid to the distressed on the seas and along our coasts. During the past fiscal year the Coast Guard was instrumental in saving the lives of 1,250 persons, removing 11,084 persons from danger, caring for 477 persons in distress,

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and saving property valued at $15,198,332. Added to these tangible appraisable services there were 1,473 instances where miscellaneous assistance was rendered. These embrace a multiplicity of humanitarian deeds inuring to the public interest and good, the exact nature and value of which it is impracticable to appraise or to set out in figures. Among these services may be enumerated those of aid to the sick and injured; furnishing food, fuel, and water to persons temporarily cut off from such supplies; recovering dead bodies; extinguishing fires in the vicinity of Coast Guard stations; warning vessels from running into danger; and an extensive line of other useful endeavor.

PERSONNEL ON A WAR FOOTING.

The personnel of the Coast Guard is on a war footing and on June 30, 1918, consisted of 228 commissioned officers, 36 cadets, 442 warrent officers, and 5,920 enlisted men. There has been no increase in the number of commissioned officers but it has been found necessary in order best to utilize the services of these officers to give them advanced temporary rank on the general plan of running-mates with officers of corresponding length of service in the Navy.

THE COAST AND GEODETIC SURVEY.

Pursuant to law the President is authorized to transfer the vessels, equipment, stations and personnel of this service to the Navy.

In addition to the making of special wire-drag and other confidential surveys for the Navy, the Coast and Geodetic Survey supplied the Navy with 126,000 charts in 1917 and with more than 102,000 in 1918.

THE BUREAU OF LIGHTHOUSES.

Under the provisions of statute law, 46 steamers used as lighthouse tenders, 4 light vessels, and 21 light sta-

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tions, together with 1,132 persons employed thereon, were transferred to the service and jurisdiction of the Navy Department and have continued in that service throughout the war.

The duties performed by the transferred units consisted principally of work on submarine nets and buoyage in connection therewith, patrol and watch service, drill in mine laying, etc. Prior to the war, for a number of years, a large proportion of the lighthouse tenders had been equipped with mine-laying equipment and had periodic drills in this work.

OPERATIONS IN SOUTH AMERICAN AND ASIATIC WATERS.

As enemy activity has been confined principally to the North Atlantic and European waters, it has necessitated the concentration of our purely naval forces in these waters. Our Navy has, however, some representatives in South American and Asiatic waters. The activities in these waters are of general character, but have served to bring us into closer cooperation with the allies in those waters with whom we are associated.

AID GIVEN TO ALLIED SHIPPING.

Means were taken to guard the extensive station at Pearl Harbor, Hawaii, against injury, to establish sea patrols, and to increase the personnel to meet the suddenly increased demands of war conditions. These activities were not confined to the yard proper but extended to the whole fourteenth district. It is a pleasure to record that in all this work full and hearty cooperation was established and maintained with the Army and all other departments of our Government. Thus far, in spite of the enemy sympathizers, both resident and transient, in that cosmopolitan community, no report has been made of the loss of a dollar's worth of property or of injury to a single individual. Aid has been given to domestic and allied shipping and protection extended to Government and private property.

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NAVY BATTERY OF 14-INCH GUNS AT FRONT.

One of the great achievements of the Navy during the past year was the design and construction of the 14-inch naval guns on railway mountings now on the western front, which hurled shells far behind the German lines. The mount was designed, built, and delivered in less than four months. On December 26, 1917, not a drawing had been started. On April 25, 1918, a completed gun was rolling on its own wheels to Sandy Hook Proving Ground for long-range tests.

These guns were originally intended for the new battle cruisers, but a change of ship design left them available for other use. As the Navy had no immediate need for them afloat, the Chief of the Bureau of Ordnance recommended that they be utilized for land service with our Army in France.

It was realized that to be most effective the railway battery must be completely mobile and independent of any permanent artillery base. The guns themselves were mounted on cars which could move freely over the French railways. It was necessary to make the repair shops and barracks for the personnel mobile. Twelve cars were constructed to accompany each gun. There were machine-shop cars, armored ammunition cars, kitchen cars, berthing, crane, and wireless cars. These cars, as well as the gun mounts, were all built and equipped under the direction of the Bureau of Ordnance. This battery is sufficiently mobile so that were an order to move position received while the gun was in action, gun, personnel, kitchen, fuel, berthing cars, and all could be under way in about an hour.

MANNED BY NAVY GUNNERS.

The land battery was manned exclusively by bluejackets under the command of Rear Admiral C. P. Plunkett. The men were trained at the Naval Proving Ground, and went to France ahead of the guns to pre-

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U. S. NAVAL GUN IN ACTION NEAR SOISSONS

pare everything for their assembly. The first group arrived in France on June 9, 1918. The first gun was shipped from the United States on June 20. It was ready to fire the last week in August; but did not go into action against the enemy until September 16 in the vicinity of Laon, from which time this gun with its sister guns was engaged in firing against German bases far behind the enemy lines and hitherto completely beyond the reach of allied artillery.

The naval land batteries fire heavier projectiles and have greater range than any gun ever before placed on mobile shore mounting. The German long range "freak" guns which fired on Paris were non-mobile. They were built on permanent steel and concrete foundations which were eventually sought out by allied aeroplanes and the guns subsequently silenced. The shells were small and specially built for long flight. This fact reduced their military efficiency. The German long-range guns, while they had a certain moral effect, were

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without great practical military value. The American naval guns fire projectiles approximately seven times heavier than the shells the Germans used against Paris.

CAN HURL BIG PROJECTILES 30 MILES.

In 1916 the Germans had one 15-inch naval gun in Flanders, which became famous through its long-range bombardment of Dunkirk and other allied bases. This gun was on a permanent foundation and could not be shifted from point to point on the front. Our 14-inch gun can move from one end of France to the other, and it hurls its projectile a distance of approximately 30 miles (52,000 yards).

Briefly, the American Navy has designed, built, and is now manning with bluejackets specially trained for land service, the largest and most high-powered mobile land artillery in the world. So successful have these guns been that additional orders for many more were requested before the armistice.

NAVAL LOSSES CAUSED BY SUBMARINE WARFARE.

Since this country entered the war practically all the enemy's naval forces, except the submarines, have been blockaded in his ports by the naval forces of the allies, and there has been no opportunity for naval engagements of a major character. The enemy's submarines have, however, formed a continual menace to the safety of all our transports and shipping, necessitating the use of every effective means and the utmost vigilance for the protection of our vessels. Concentrated attack was made by enemy U-boats on the ships which carried the first contingent of our troops to Europe, and all that have gone since have faced this liability to attack.

Our destroyers and patrol vessels, in addition to convoy duty have waged an unceasing offensive warfare against the submarines. In spite of all this, our naval losses have been gratifyingly small. Not one American

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troop ship, as previously stated, has been torpedoed on the way to France, and but three, the *Antilles*, the *President Lincoln*, and the *Covington*, were sunk on the return voyage.

Only three fighting ships have been lost as a result of enemy action—the patrol ship *Alcedo*, a converted yacht, sunk off the coast of France November 5, 1917; the torpedo-boat destroyer *Jacob Jones*, sunk off the British coast December 6, 1917; and the cruiser *San Diego*, sunk near Fire Island, off the New York coast, on July 19, 1918, by striking a mine supposedly set adrift by a German submarine. The transport *Finland* and the destroyer *Cassin*, which were torpedoed, reached port and were soon repaired and placed back in service. The transport *Mount Vernon*, struck by a torpedo on September 5 last, proceeded to port under its own steam, and was repaired.

The most serious loss of life due to enemy activity was the loss of the Coast Guard cutter *Tampa*, with all on board, in Bristol Channel, England, on the night of September 26, 1918. The *Tampa*, which was doing escort duty, had gone ahead of the convoy. Vessels following heard an explosion, but when they reached the vicinity there were only bits of floating wreckage to show where the ship had gone down. Not one of the 111 officers and men of her crew were rescued; and though it is believed she was sunk by a torpedo from an enemy submarine, the exact manner in which the vessel met its fate may never be known.

LOSS OF THE COLLIER "CYCLOPS."

There has been no more baffling mystery in the annals of the Navy than the disappearance last March of the U. S. S. *Cyclops*, Navy collier of 19,000 tons displacement, with all on board. Loaded with a cargo of manganese, with 57 passengers, 20 officers, and a crew of 213 aboard, the collier was due in port on March 13. On March 4 the *Cyclops* reported at Barbados, British

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West Indies, where she put in for bunker coal. Since her departure from that port there has not been a trace of the vessel, and long-continued and vigilant search of the entire region proved utterly futile, not a vestige of wreckage having been discovered. No reasonable explanation of the strange disappearance can be given. It is known that one of her two engines was damaged and that she was proceeding at reduced speed, but even if the other engine had become disabled it would have not had any effect on her ability to communicate by radio. Many theories have been advanced, but none that seems to account satisfactorily for the ship's complete vanishment. After months of search and waiting the *Cyclops* was finally given up as lost and her name stricken from the registry.

SALVAGING AND ASSISTING VESSELS IN DISTRESS.

During the year a salvaging division has been organized, and the operation of this division has resulted in the saving of lives and property. There have been numerous calls on this division for assistance from all kinds of vessels during the year, including towing, rescuing, and convoying disabled vessels, as well as salvaging vessels which were sunk or grounded in home waters. All such calls, from all sources, have been promptly answered and assistance rendered.

The question of salvage of vessels damaged by mines or torpedoes has been a very acute one abroad, and also important along United States coasts. The Navy Department during the year has taken over many of the vessels and much of the equipment engaged in coast salvage work and has sent one unit abroad, where it is now operating. The salvage work has been fully organized, utilizing the services of a number of very competent salvage engineers who had been engaged in this work with private companies.

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ANTISUBMARINE DEVICES.

The department has been keenly appreciative of the necessity of employing every effort to develop devices with which to combat the enemy's submarine operations. Advices and suggestions were freely requested and carefully considered by the department, the Naval Consulting Board, the National Research Council, the various bureaus and departments, the General Board of the Navy, and other boards in Washington.

In order to coordinate the efforts in this matter the department appointed a special board of officers to have complete charge of carrying out experiments on antisubmarine devices. The General Electric Co., the Western Electric Co., and the Submarine Signal Co. patriotically offered every assistance in this work, and with a fine spirit of co-operation have rendered valuable service.

An experimental station was established at New London, Conn., under the supervision of the special board, and many scientists of unusual attainments were assembled there in connection with the experiments and development of devices for detecting submarines.

The naval activities at New London, Conn., embrace also a station for assembling and installing various devices developed and training the personnel for the efficient employment of such devices afloat. The results achieved by these methods have been most gratifying; and the operations of vessels fitted with these devices, both abroad and in home waters, has had a marked effect in restricting submarine operations.

AEROPLANE BOMBS FOR USE AGAINST SUBMARINES.

A heavy aeroplane bomb has been developed for antisubmarine warfare, which has not only all of the qualities of an aero bomb, but those also of a depth charge. When an aeroplane sights a submarine and attacks with bombs, the bombs will explode if a direct hit be obtained upon the submarine. A submarine attacked from

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a height is a rather difficult target to hit and these bombs compensate somewhat for that. Should the bomb miss the submarine it will detonate on reaching a predetermined depth and will thus have the effect of a depth charge.

Formerly, bombs were of a more or less delicate nature and impact with the surface of the water was sufficient to detonate them. A submarine running below the surface was therefore practically immune from damage from aircraft attack; but these bombs can be set to explode at considerable depth below the surface and in all they make the aeroplane a much more formidable antisubmarine asset than ever before.

The Navy's new bomb sights for aeroplanes are considered to be the equal of anything in use at present. These were developed after exhaustive investigations had been made of all sights in use by our allies and our enemies; the latter from captured machines.

DEPTH CHARGE MOST EFFECTIVE ANTISUBMARINE WEAPON.

The successful operation of the depth charge and the development of tactics for attacking submarines with them have been the most potent factors in the solution of the German submarine menace. These charges are now being produced in quantities considerably in excess of the needs of our Navy and merchant fleet, and so tremendous is their destructive quality and so thoroughly has strategy for their use been developed, that it is a lucky submarine which shows itself or its periscope within view of a destroyer and survives the subsequent bombardment.

With the earlier development of the submarine its possibilities as a weapon of offense were vaguely conceived. Defense against submarines, however, was largely confined to the general doctrine of gun and torpedo. The Germans made such great strides in submarine development that the opportunity of catching a submarine on the surface and destroying him by gunfire

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became exceedingly scant. Because of his low freeboard he could detect the approach of a hostile vessel and submerge before that vessel sighted him. Through construction improvements and intensive training of personnel, the submarine could submerge even when caught napping before guns could be effectively trained upon him. Through a skillful use of the periscope a submarine could attack with little danger except from an occasional lucky shot or from ramming.

Some method of attacking the submarine under water was necessary. Charges of explosives such as shells or bombs detonating by contact would injure a submarine if the U-boat were struck, but a moving submarine 100 feet below the surface is a difficult target to hit. There was desired, therefore, not so much a contact charge which would function on striking the submarine, as an explosive charge which would fire near the submarine at a good depth below surface and have such a tremendously powerful effect as to damage the enemy although it were 200 feet away from the point of detonation.

Prior to the entrance of the United States into the war the use of depth charges had begun, but had not been carried out to any marked extent abroad; yet the United States realized the necessity of being adequately armed with this new weapon against the submarine.

EXPLOSIVE INCREASED—NEW TYPE DEVELOPED.

Our Navy undertook depth-charge development shortly after the opening of unrestricted warfare. The first design contained 50 pounds of explosive and was operated on a float-and-line principle. A float detached itself from the charge proper upon striking the water and remained on the surface while the charge sank and in sinking payed out rope attached to the float; when a predetermined length of rope had run out the charge exploded.

On the declaration of the war these charges were almost immediately available for issue to the vessels of

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the United States Navy. It was soon apparent, however, that with the construction of larger and stronger submarines the 50 pounds of explosive was not sufficient and immediately the development of larger charges was undertaken. The naval torpedo station at Newport developed a type of hydrostatically operated depth charge which subsequently was proven at least the equal of any other depth charge known to be in existence.

The depth charge has taken a place in the front rank of effective weapons of warfare alongside of the gun and torpedo, and it is destined to remain in that company as long as the submarine is employed as a weapon of war upon the seas. Our destroyers abroad made extensive use of the depth charge, and of all the weapons it was the one most feared by the German submarine. It has perhaps been noticed that German submarines were reluctant to attack convoys accompanied by destroyers and that they confined their attentions largely to ships which, through breakdown or any other reason, fell out of line and dropped far behind the escorting destroyers.

TACTICS IMPROVED—"Y" GUN DESIGNED.

Along with the development of the weapon itself tactics for its use have progressed from an occasional chance shot to a veritable bombardment. At first vessels carried one or two depth charges and dropped only one against the submarine. Gradually the number of depth charges carried has increased until now a destroyer will frequently carry more than a hundred.

The possible movements of a submarine after its discovery has been carefully studied and scientific curves have been determined enabling a swift attacking vessel to drop depth charges in the form of a barrage about the submarine, regardless of which direction the submarine turns after attack or how great her speed.

A new gun known as the "Y" gun has been designed and built especially for firing depth charges. All our destroyers and sub-chasers were equipped with this wea-

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pon. It is proving in service the equal of any material in use as depth-charge projectors and has increased the efficiency of depth-charge attack, as it enables depth charges to be thrown astern or on either side of the attacking vessel, thus widening the danger zone for an enemy submarine. Already the Navy has armed with depth charges a large number of allied ships.

NEW TYPE PRODUCED IN 30 DAYS.

One year ago the depth charge was a comparatively new weapon to our service. Ten thousand 50-pound charges had been manufactured up to that time. Since then twenty-eight thousand 300-pound charges and five hundred 600-pound charges have been delivered. There are now three manufacturers working on contracts for over 30,000 more.

As a side light on what can be accomplished in the way of rapid production, it is interesting to note that on July 26 orders were issued, on the request of Vice Admiral Sims, to manufacture a new type of charge holding double the usual amount of explosive. The design was completed and first shipment made from the manufacturers' plant within 30 days from that date.

NONRICOCHETING PROJECTILE ACTS AS A DEPTH CHARGE.

The ordinary pointed projectile, hitting the water almost horizontally, is deflected and ricochets. Consequently the hull of a submarine below the surface of the water is protected from ordinary shell at short ranges. A special type of nonricocheting shell has been developed for use against the submarines and has now been issued to ships sailing the war zone.

This shell has an additional feature. It is equipped with a delay-action fuse, so that if it misses the submarine it dives below the surface until a predetermined depth has been reached, where is explodes. If it happens

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to be near a submarine, a direct hit is not necessary, because its detonation has the same effect as a depth charge, but naturally to a considerably smaller extent.

CAMOUFLAGE—SYSTEM OF "DAZZLE PAINTING."

Since the beginning of the war the question of painting vessels in such a manner as to prevent their being seen, or to enable them to escape submarine attack, has been much discussed. It is not quite the same as "camouflage" as it is generally understood on land, where objects at rest are painted or marked in such a manner as to prevent their being identified against a fixed background. Experience has shown that no system of marking will materially reduce the visibility of a vessel; that a uniform coat of paint is about as good as anything for the purpose of reduction of visibility, but unfortunately the most desirable color varies with conditions. Experiments which have been carried on for years in our service had indicated a light gray, commonly called "battleship gray," as about the most desirable color for all-around purposes. This appears to have been confirmed by war experience. There has been developed, however, particularly during the last year, a system of so-called "dazzle" painting—the vessel being painted in an apparently grotesque and bizarre manner for the purpose, not of rendering it invisible, but rendering it difficult for the submarine commander, peering through his periscope for a few seconds at a time, to determine the course of the vessel. While not always effective, there is no doubt that dazzle painting is a palliative against submarine attack, and during the last year its application, not only to naval vessels, but to all vessels of the Emergency Fleet Corporation, has been systematically undertaken. A division was formed in the Bureau of Construction and Repair which undertook the preparation of the designs for all vessels, and the Emergency Fleet Corporation arranged to paint the vessels in accordance with the designs supplied. Up to the 1st of

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October not less than 1,127 vessels had been specially painted upon designs prepared in the Navy Department.

ARMING MERCHANT SHIPS.

Almost the first problem which faced the Navy was to secure, as far as possible, the safety of our merchant fleet engaged in carrying food, munitions, and supplies to the military forces at the front. Germany, in attempting her submarine war, in the beginning chose to use her submarines in the way that would net her the best and quickest returns, regardless of obligations to protect civilian passengers. She, therefore, instead of using torpedoes attempted to sink by gunfire or by bombs all the merchant ships that fell in the path of her U-boats.

The department quickly realized that an answer to this which would immediately reduce submarine efficiency and confine its activities to under-water activities was to arm our merchant ships. In so doing, we were forced to make use of the means at hand rather than what we desired to do, but immediately plans went forward to anticipate Germany's next move, which afterward she did make in the form of her cruiser submarines. The cruiser submarine was Germany's counter to the arming of our merchant ships, but by the time those submarines were in operation, the best of our merchant fleet had been armed with a caliber of gun which was able to cope with the heaviest gun of the cruiser submarine.

In the first part of this war some of the most interesting encounters were those between our armed merchant ships and single enemy submarines, and there are cases on record where our armed guards fought until the ship under them went down or they were forced to abandon the vessel in flames.

MERCHANT SHIPS PROTECTED BY INCREASED ARMAMENT.

At the declaration of war it was realized that to protect the country's shipping from attacks of enemy sub-

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marines it would be necessary to arm those merchant vessels traversing the war zone. At first it appeared that guns of about 3-inch caliber would be amply large for defensive work; but with the advent of the enemy submarines mounting from 4 to 6 inch guns, it soon became evident that larger calibers would be required. In addition, the large and rapidly increasing demands of the naval service for guns had to be met.

The arming of merchant ships has largely been accomplished. Since the war started 2,570 ships, excluding regular war ships of the Navy, have been armed in one way or another. The first merchant ship to be armed was the oil tanker *Campana*. Since that time every merchant ship in the Atlantic trade needing arms has been armed as the guns have become available, and those guns provided with naval crews. Since the arming of the *Campana* more than 1,600 merchant vessels have been furnished with batteries, ammunition, spare parts, and auxiliaries—a procedure which had never been contemplated by the department prior to the outbreak of war. In addition to this more than 650 patrol boats and all of our subchasers have been armed and guns of various calibers have been furnished to portions of the British and French naval and merchant fleets. Our 14-inch guns mounted on British monitors participated in the attack on Zeebrugge. Our medium-caliber guns mounted on floats manned by Italian crews were important factors in the defense of Venice. We have manned a large portion of the French fishing fleet and have equipped not only with guns, but with depth charges, a number of French mine sweepers.

Some of the merchant ships have even been armed with depth charges, and practically all of these ships carrying naval guns and naval gun crews have been equipped with special smoke-producing apparatus provided to enable the ship to conceal herself in a cloud of smoke when attacked by a submarine. Several types have been developed, and the proper type issued to ships according to the character of the vessel. Vessels having

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necessary gun power—that is, guns sufficiently large to out-range an enemy submarine—invariably prefer to engage in gun duels with the enemy rather than to escape in a smoke screen.

NAVAL COMMUNICATION SERVICE.

The scope of the duties of the Naval Communication Service has been greatly enlarged to provide an efficient, workable system for handling all communications with men-of-war, to provide the necessary codes and ciphers to insure secrecy, and to promulgate regulations to insure the proper receipt of orders by all vessels of the Navy. In addition to the usual duties in connection with the combatant ships of the Navy, this service has placed all radio communication with merchant vessels in the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico upon a military basis. To accomplish this, such vessels have been provided with standard rules for communication, and codes and ciphers to handle same, in order to render their voyages through the war zone as free from danger as possible, as well as to insure their receiving orders at sea. This service has close cooperation with the detailing of radio men to all merchant ships crossing the Atlantic, as well as to all Shipping Board ships built by the Emergency Fleet Corporation. A comprehensive system for inspection of radio personnel, radio apparatus, and their communication records has been provided on the foregoing ships, so that they are inspected upon arrival in port, when they are given the necessary instructions to properly carry out their work.

The expansion of the Code and Signal Section has necessarily been great. This section not only supplies men-of-war but all merchant ships in the Atlantic with codes and ciphers and coordinates the communication procedure and codes of countries cooperating with us in the war with those of our own men-of-war and merchant vessels. This enables all United States vessels to communicate with secrecy in any part of the world.

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GROWTH OF RADIO SYSTEM.

The Navy has operated all coastal and high-power radio stations since the start of the war. While the commercial service on the Atlantic and Gulf coasts has been practically abandoned for the war, in order to handle naval and military traffic only, the commercial service elsewhere has been carried on with but few restrictions as far as ship to shore work is concerned. The Navy occupies a strong position in the commercial radio field on account of efficient service rendered, and I think presages the way for making this service entirely governmental.

The commercial radio service between Japan, Hawaii, and San Francisco has been temporarily suspended, in order to prevent information reaching the enemy through this source. This work will be resumed when conditions warrant, in order to relieve the severe congestion of the trans-Pacific cables. Official business is still handled over this trans-Pacific radio circuit, but all such traffic passes through the hands of the Navy for proper enciphering to insure secrecy.

The high-power radio service of the Navy has made great progress during the past year. On the Atlantic coast the Navy has completed and is operating its new high-power station at Annapolis, Md., in addition to those already in service. It is now possible to transmit messages simultaneously from four high-power radio stations to European stations and at the same time receive dispatches from several European stations.

The Naval Communication Service is cooperating with the State Department and the Committee on Public Information in the broadcasting of information of advantage to the United States to all parts of the world by high-power radio.

Official dispatches by trans-Atlantic radio are handled not only for the departments of this Government, but also between foreign embassies here with their home offices abroad. It has been the aim of the Naval Com-

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munication Service to create, for the benefit of this country and its allies, practical, fast and exact radio communication with Europe, supplementing the cables and to a certain extent relieving them of the heavy traffic brought on by the war. The results accomplished are satisfactory.

CABLE CENSORSHIP.

The office of the chief cable censor, which administers and regulates cable censorship as a whole, is in the Navy Department; and local stations, where the actual censoring of cablegrams is for the most part done, are maintained at the points of cable landings within the United States and its territorial possessions.

Close contact has been established and maintained with the various departments of the Government, and also with the special governmental boards and bureaus, the War Trade Board, the Food Administration, the Shipping Board, the Alien Property Custodian, etc.

As a result of the cooperation of cable censorship, these governmental agencies have been enabled to conduct their work more effectively; they have received from cable censorship a very positive assistance in the execution of their policies and have, in many instances, further received special information, gleaned from the cables, which has resulted in the saving of large sums of money. Further coördination of action has been attained by close contact with the censorships of Great Britain, France, Portugal, Brazil, and Cuba. Representatives of cable censorship are also placed at every station of postal censorship, and a satisfactory system has been developed by which inconsistent policies between the two censorships have been avoided.

POWERFUL RADIO PLANT COMPLETED.

Hawaii, situated as it is at the "crossroads of the Pacific," whether in the piping times of peace or in the midst of war's alarms, will always demand our attention

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and consideration. While the needs for men and material in other parts of the theater of war have lessened our activities in the Pacific, yet this important outpost in that sea has not been neglected and work on the original plans for its development, with necessary modifications, has been continued as far as circumstances permitted. At the outbreak of the war, acting promptly and according to prearranged plans, our naval people took over six commercial radio stations and in 48 hours placed them under naval control. In this same field the great Pearl Harbor radio plant, one of the most powerful in the world, was pushed to completion and now forms a link in the chain of communications to our far distant stations.

IMPORTANT WORK OF NAVAL INTELLIGENCE.

The exigencies of war have imposed new and important duties upon Naval Intelligence. In peace the function of this agency of the Navy Department is to keep in touch with naval problems, naval expansion, and naval interest in all the countries of the world so that the President, the naval administration, and the responsible naval leaders in Congress may have access to the latest information with reference to naval affairs abroad. Its reports from naval attachés in the leading countries and from other sources furnish the General Board, the Chief of Operations, and the bureaus data which gives them the benefit of what has been learned or put into practice in other countries. During the war its duties abroad have increased many fold; at home it has—in touch with the 15 naval districts and branch offices—done a most important work in protecting naval and other plants making war material; preventing sabotage, and in keeping an eye on alien enemies or others with a destructive propensity. Close coöperation has been had with the Departments of State, War, Justice, Treasury, and Labor, and, in addition, with the War Trade Board, the United States Shipping Board, and the Alien Property Custo-

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dian. The interchange of information and the results of investigations with these departments of the Government have been most effective and valuable to the prosecution of the war.

A detailed account of the work of the office may not be stated as it is of a highly confidential character, but, generally speaking, the scope of its activities include observation, investigation, and report of all subjects affecting the Navy and the prosecution of the war from a naval point of view. It includes naval operations at sea and on land, the status, changes, and progress of the material and personnel of foreign navies, and a close counterespionage watch at home. This latter includes the investigation of unauthorized radio stations, of alien enemies and suspects, of matters connected with the cable and mail censorship which affect the Navy, the protection of water fronts and vessels, and of plants having contracts with the Navy Department with a view of safeguarding those plants against sabotage.

The guarding of our ships while in port and the guarding against the danger from enemy agents among the passengers and crews on both our trans-Atlantic and coastwise ships have been largely performed by the Office of Naval Intelligence, and the results achieved bear eloquent witness to the efficiency of the service rendered.

WORK OF THE GENERAL BOARD.

The General Board, of which the late George Dewey, the Admiral of the Navy, was long the head, has given wise counsel during this year when the study of naval strategy and naval needs has had practical application in actual warfare. Rear Admiral Charles J. Badger, chairman of executive committee, and other able officers of the board, in addition to their illuminating reports, have been in intimate touch with the Secretary of the Navy and the Chief of Operations and with the

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officers of allied navies in our country, and their advice has been of the greatest value.

The work of the General Board for the fiscal year ending June 30, 1918, included action upon all questions referred to it by the Secretary of the Navy for investigation and recommendation. In addition, the General Board has from time to time made such suggestions and recommendations to the department as in its judgment were called for by the progress of the war.

Many of the questions proposed have required careful research and a knowledge of the latest and most approved practice at home and abroad. In order that the board might have the latest and best information upon all subjects connected with service operations and technical matters, officers returning to the United States from duty in the war zones have been invited to appear before the General Board and an official stenographic record has been kept of their observation of actual war conditions and their opinions and recommendations with regard to service methods, practices, and mechanisms.

SUBJECTS BOARD HAS ACTED UPON.

The scope of the work of the General Board is indicated in the following partial list of subjects that have been acted upon.

PAPERS REFERRED FOR THE ACTION OF THE BOARD.

Antiaircraft defense of naval stations.
Defense plans for naval districts.
Purchase of certain Pacific islands.
Comments and recommendations on quarterly reports of bureaus on preparations for war.
Discussion of types of seaplanes and seaplane carriers.
Tactics and strategy of submarines.
Proposed operations against submarines.
The use of homing pigeons by the Navy.
Sovereignty and control over islands and harbors in Caribbean and Panama.

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Defense of the Panama Canal; organization of naval forces; mine and net defenses.

Searchlight illumination in naval operations.

Seaplane catapults for battle and scout cruisers.

Acquisition of naval-station site, Fonseca Bay, Honduras.

Recommendations upon suggestions for the conduct of the war.

Distribution and employment of drifting mines.

The proposed purchase and operation by the Government of the Cape Cod Canal.

Proposed construction of a mine barrier in the North Sea.

Proposed measures to prevent German submarines from operating against allied commerce in the Atlantic.

Plans for defense of Guam and plans for construction of operating base.

Types of vessels for offensive use against submarines.

Design of new submarines.

General aeronautical policy of the United States.

Treaty concerning prizes captured during present war.

Reply to German Government re reciprocal repatriation of sanitary personnel.

Guns for long-range bombardment.

Shore mounting of heavy guns.

Ownership of islands and reefs pending in the Pacific Ocean and elsewhere.

Mine-laying arrangements for destroyers.

Plan for blockading enemy coast by submarines.

Submarine devices for detection of submarines.

Plans for proposed patrol boats.

Proposed removal of guns from battleships.

THE NAVY'S PART IN THE UPBUILDING OF OUR MERCHANT MARINE.

The Navy has always had very much at heart the upbuilding of a merchant marine, for from this source it must largely draw its supply of seafaring men needed

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to man our naval craft. Therefore, it very early became a matter of extreme importance to the Navy to ascertain the best way in which this large merchant service which was being built by the Emergency Fleet Corporation, and which had been requisitioned by the Shipping Board, could be put to efficient war work. Plans were worked out in cooperation with the Shipping Board and with the Army whereby all of the ships turned over for Navy purposes, the cargo ships turned over to the War Department for supplying their Army abroad, and vessels of a certain size running through the war zone should be manned by naval crews.

Had the war been of a different character, it is possible that merchant shipping might not have been dislocated to the extent that it was, but the character of the war was such that practically every commercial interest disappeared and all interests became military in their character. The needs of the Army alone, both in troops and supplies, were so great as to practically demand the turning over to their use, not only all of our own available tonnage, but such allied tonnage as could be chartered. It, therefore, appeared quite necessary that this tonnage operating for a military purpose should be under strict military control, which in so far as transporting across sea was concerned was a naval matter. Above all, the character of the warfare waged by enemy submarines was such that at no time could the seas be called free, and there was the constant menace to crew and cargo which required the highest technical skill to combat it. For these reasons it became necessary to man with naval crews those vessels that crossed the war zone, and in this matter the Shipping Board and War Department heartily concurred. The troop transports were, from the very beginning, manned with naval crews, as it was recognized that the lives of our soldiers could only, on the seas, be entrusted to those whose experience fitted them to give the maximum amount of safety. The wisdom of this policy is shown by the results, in the

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number of troops and cargo safely transported across the Atlantic.

With the end of this war, another problem will face the Navy. If it is considered to be the policy that the upbuilding of war-devastated Europe and furnishing food for its peoples will be a governmental problem to be administered by us as a Nation, this important service should be performed by that Government organization best fitted to cope with the problem. If this be the case, the military problems of the past year and a half merely merge themselves into economic problems similar to those which we as a nation have just successfully coped with. Then it may be that the Army organizations which have so successfully ministered to our forces in France will be called upon to supply food for the starving millions. If that be so, then the Navy would properly be called upon to man the ships for this purpose and while the process of demobilization goes on, in so far as our lesser purely military units are concerned, it may be necessary for a number of years to come for the Navy to take an important part in the merchant marine service.

NAVAL OVERSEAS TRANSPORTATION SERVICE.

On January 9, 1918, the Naval Overseas Transportation Service was established, owing to the foreseen necessity to expeditiously supply the naval forces in foreign waters and to assist the Army if necessary with their tremendous task of transporting and supplying the American Expeditionary Force in France. This organization sprang into being almost overnight, and has proved its right to be reckoned as one of the most important and successful operations of the Navy.

At the outbreak of the war the lack of an American merchant marine was immediately felt. The United States Shipping Board was authorized, and the vast task of creating a merchant marine was undertaken. The United States was without a sufficiently large trained merchant marine personnel, as the seagoing population

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of this country was small compared to that which followed the pursuits on shore. The difficulty of obtaining this trained personnel to man the vast American merchant marine was immediately felt, and the Navy Department was ready to assist in every way. It was asked to man immediately two vessels, in order to hasten their departure overseas, and from this inception the Naval Overseas Transportation Service has grown in 10 months to a fleet of 321 cargo-carrying ships aggregating a dead-weight tonnage of 2,800,000, and numerically nearly equalling the combined Cunard, Hamburg-American, and North German Lloyd Lines at the outbreak of the war. Of this number 227 ships represented vessels previously in operation. From the Emergency Fleet Corporation the Navy has taken over for operation 94 new vessels, aggregating 700,000 dead-weight tons. On March 21, 1918, by order of the President 101 Dutch merchant vessels were taken over by the Navy Department pending their allocation to the various vital trades of this country, and 26 of these vessels are now a part of the naval overseas fleet. This vast fleet of cargo vessels has been officered and manned through enrollment of the seagoing personnel of the American merchant marine, officers and men of the United States Navy, and the assignment after training of graduates of technical schools and training stations, developed by the Navy since the United States entered the war.

There are required for the operation of this fleet at the present time 5,000 officers and 29,000 enlisted men, and adequate arrangements for future needs of personnel have been provided. The Navy has risen to the exacting demands imposed upon it by the war, and it will certainly be a source of pride to the American people to know that within 10 months of the time that this new force was created, in spite of the many obstacles in the way of its accomplishment, an American naval vessel, manned by an American naval crew leaves an American port on the average of every five hours, carrying subsistence and equipment so vital to the American

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Expeditionary Force. I would be derelict in my duty unless I expressed my keenest appreciation and heartiest admiration for those men of the Naval Overseas Transportation Service who have traveled the lonely lanes of the ocean, which have been for so long infested with the menacing submarine. These terrors have not been regarded as terrors by this personnel. They have braved the dangers most willingly and have thereby exemplified the best traditions of the Navy of the United States. In the many engagements with the enemy submarines our fleet has necessarily suffered, but it is believed that the losses of the enemy have been relatively much greater than ours.

AN ENGINEERING WAR.

It is a truism to say that, both on land and sea, this is very largely an engineering war. On ship and shore and in the air its mighty enginery is, in its destructive power, its transports and control, a product of the chemistry of explosives and of engineering in all its branches. It is the engineer, too, who, girdling the earth with wireless telegraphy, has given means of instant communication between a Government and its fleets and armies half a world away.

ELECTRIC PROPULSION A GREAT ADVANCE.

The most striking engineering accomplishment during the year was the completion of the electrically propelled battleship *New Mexico*, the results of whose trials confirm the judgment of the department in adopting this type of machinery for the battle cruisers, and mark an engineering advance which will affect battleship construction the world over. Electric propulsion had its inception in the Navy, having first been applied in the collier *Jupiter*, where its superior advantages were so clearly demonstrated that the Bureau of Steam Engineering recommended it for adoption in the *New Mexico* and subsequent battleships, and still later in the high-pow-

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ered battle cruisers. It will be recalled that this decision of the department led to the bitterest criticism not only from engineers pecuniarily interested in other types of machinery but also from others eminent in their profession who had no pecuniary interest, but who feared that we were embarking upon an experiment that would be fraught with national calamity. Despite the criticism of these eminent engineers, the decision of the Navy Department, supported by the judgment of the best electrical engineers in the country, was followed in the full conviction that no mistake was being made.

"NEW MEXICO" MET WITH EVERY TEST.

The wisdom of this decision has been amply vindicated by the performance of the *New Mexico*, which has been tested in every way, her trials including many more than those specified in the contract. She has failed in none of them; the operation of her machinery has been highly satisfactory in every respect; and to-day, in this unique vessel, the United States Navy has a battleship which has no peer in the world's navies, not only for economic propulsion and less liability to serious derangement, but for her military superiority in greater maneuvering power and increased underwater protection. As so often before, American ingenuity and inventive skill now lead the world in the propelling machinery of battleships.

REPAIR OF GERMAN SHIPS.

When war was declared with Germany all the German ships lying in our ports, many of them of the highest class of trans-Atlantic passenger steamers, were immediately taken over by our Government. Upon examination by our officers, it was found that the machinery of all of them had been deliberately damaged by their crews, in many cases seriously, and the character of the injury was such as to denote that the work had been carried out under a central direction and that it had been well planned.

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When taken over, these ships, to the number of 103, were put under control of the Shipping Board, which later transferred 34 of them to the Navy for use as troop and freight transports, and subsequently added 20 more to be repaired and returned to the board.

The principal damage was the breaking of cast-iron parts of the main engines, chiefly the cylinders, though in one case piston rods, connecting rods, and boiler stays were sawed half in two, and in others the boilers were ruined by dry-firing and had to be renewed. There was, in addition, much vandalism of a minor character, but the remedying of this was insignificant in comparison with the gigantic task of repairing the cylinders, some of which were more than 9 feet in diameter.

ELECTRIC WELDING SOLVED CYLINDER PROBLEM.

It was speedily recognized that the large passenger ships thus taken over would have to be our chief reliance in transporting troops to France, and their quick repair became a matter of great national interest. After a survey by representatives of the Shipping Board, which at the time had custody of them, it was decided to make new cylinders. This decision was in accord with usual practice and also with the rules of marine underwriters, and but for the number of ships and the large number of cylinders involved would probably have been followed. But the time required was prohibitive and while the subject was under discussion a few of the ships were transferred to the Navy and sent to the New York Navy Yard for repairs.

As the Navy was not bound either by previous practice or the rules of marine insurance societies, the engineer officer of the yard, after conference with an electric welding company, recommended that the broken cylinders be repaired by welding, and in this he was heartily supported by the industrial manager of the yard. The matter was referred to the Bureau of Steam Engineering, and the assistant to the bureau was directed to make a

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thorough examination of all conditions on the ex-German ships. As a result of his investigations, orders were issued to make all repairs where possible by electric welding and to resort to mechanical patching only where welding was impracticable.

PROVED A COMPLETE SUCCESS.

This decision, so far-reaching in its application and so fraught with danger to the professional reputation of the officers concerned, was made in the face of opposition by engine builders and by marine insurance companies but with such confidence in the ultimate result as left no room for doubt of its success. Electric welding was well known, but its application on such an extensive scale was unprecedented; by its use these damaged cylinders could be saved, the work could be done without removing the cylinders, and all the vessels could be made ready for service probably a year before they could have been if the cylinders were renewed.

Upon completion of repairs, which were carried out uninterruptedly for 24 hours a day, each vessel was sent to sea for a test under full-power conditions for 48 hours, the purpose being to ascertain whether the work of repair had been well done and to determine whether the ships were in condition to be intrusted with the transportation of troops. So well and so successfully were the repairs accomplished that there was not a single instance of a defective weld, nor has one developed during the months of arduous service on which these ships have been engaged.

SAVED YEAR IN TIME AND $20,000,000.

I have entered upon so full a statement of this case because I think it stands out as one of the greatest engineering achievements of the period. The perpetrators of the sabotage were confident that they had damaged the machinery of these ships beyond repair, which fact is

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evidenced by a memorandum found on board one of them, in which each case was carefully noted, followed by the significant remark, "Can not be repaired"; and the speedy rehabilitation of these vessels in the face of such German confidence is a splendid triumph of American ingenuity and an evidence of American engineering accomplishment that is deserving of the highest commendation. The restoration of these magnificent ships to service reflects the greatest credit upon the naval officers concerned and upon the officers and employees of the welding and engineering companies who carried out the work.

As a side light on this work it has been made the subject of careful estimate and determination that the repair of these ships resulted in a saving of 12 months in time, enabled us to transport at least 500,000 troops to France, and effected an economy which is conservatively estimated at upwards of $20,000,000.

BUILDING 60 HEAVY GUNS FOR SERVICE IN FRANCE.

Owing to the changed conditions of warfare, it was decided to remove the 7-inch guns from a number of our battleships, substituting therefore a quicker firing and lighter gun. It was at first believed that the most effective use of the 7-inch guns could be made by placing them on railroad mountings, but Gen. Pershing said he did not wish them in that form.

It was decided to place them on mobile mountings. In the use of high-powered heavy artillery on land guns, such as these and the Navy's 14 inch, railway mounts had invariably been transported in carriages from which on arrival at firing points it was necessary to shift them to a firing mount. This destroyed to a great degree their mobility. The Navy Ordnance Bureau in its mount design sought and found a method of mounting that would make heavy guns as mobile as field artillery. The weight of this high-powered gun, however, throwing a projectile weighing some 165 pounds, at a muzzle

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velocity of 2,800 feet per second, rendered the use of any wheeled gun carriage impossible. Accordingly, a new type of mount was evolved in which the principle of the caterpillar belt was utilized. Instead of wheels, two long endless belts were provided, which so increased the ground-bearing surface that the entire gun and mount, which weigh in the neighborhood of 38 tons, may be readily transported over rough and newly made ground. Twenty of these mounts are now nearing completion. When finished they will be manned by a regiment of picked Marines, the equipment for which has been furnished by the bureau.

The first two mounts have been tested and proved eminently satisfactory. Following the test of the first 7-inch mount, the Army requested the Navy to furnish it with 36 guns similarly mounted; construction of these mounts is progressing rapidly.

STAR SHELLS REPLACE SEARCHLIGHTS IN ILLUMINATING ENEMY VESSELS AT NIGHT.

The American Navy has developed a shell which, when fired in the vicinity of any enemy fleet, will light it up, make it visible, and thus render it an easy target. This most recent naval development is in response to the demand for some means of searching out the enemy at night. For many years the need of lighting the enemy for night battle has been supplied by high-powered searchlights, but the ever-increasing range of naval artillery outstripped the development of the searchlight and some more effective method was necessary.

There was an additional objection to the use of searchlights which the star shell overcomes. The beam of the searchlight at night, no matter how well screened and how well focused, presents a single pencil only and exerts a confusing and dazzling effect upon near-by observers. A yet more objectionable feature exists; the searchlight indicates the position of the vessel, so that the enemy has a clearly defined point of aim, steady

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and continuous, rather than only the intermittent flash of gunfire which, in the absence of the searchlight would alone be a means of illuminating his target.

These shells will be supplied to the vessels of our Navy so that they may illuminate the enemy at night as a target for their guns, without disclosing the position of our own ships. Not only, however, will we be able to use them for actual battle, but they will prove serviceable in the examination of suspicious objects, such as suspected submarines and vessels of any description met with at night. It is believed that this development alone represents an increase in the night-fighting efficiency of our naval vessels by at least 25 per cent.

The illuminating portion of the shell consists of a single light, or star, attached to a parachute. A unique expedient has been adopted to prevent the aggregate rush of wind resulting from the high speed of the shell while in flight from extinguishing the light after the explosion of the shell. The velocity of the light and parachute has been reduced by expelling the contents of the shell through the base, and in this manner the light and parachute acquire a rearward velocity practically compensating for the forward velocity of the shell.

U. S. NAVAL ACTIVITIES IN EUROPE.

(*Extracts from the Report of Admiral Mayo, Commander in Chief, Atlantic Fleet.*)

Cooperation with the allied navies in general is effected by means of the Allied Naval War Council, which meets monthly or as may be deemed advisable. The membership is composed of the several naval ministers and naval chiefs of staff and of officers specifically appointed to represent them in their absence. Vice Admiral Sims is the United States naval representative. The secretariat of the council is composed of British officers and personnel, with officers of the allied navies designated for liaison duties therewith.

The Allied Naval Council has advisory functions only

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and has liaison with the Supreme War Council, with a view to coordinating and unifying allied naval effort, both as regards naval work only and as regards unity of action with military or land effort. Proposals made by the several allied navies are considered and definite steps recommended to be taken in the premises. As well the naval aspects of military (land) proposals are examined into and passed upon. Conversely military (land) aspects of naval activities are referred to the Supreme War Council for consideration.

The Allied Naval Counsel has had, in common with the Supreme War Council, until last spring, the handicap of being only advisory in function. The conclusions are recommended to the several Governments for adoption, but there is no common instrumentality for carrying into effect measures which require cooperation or coordination. This state of affairs in the Supreme War Council has been remedied by the appointment of an allied commander in chief in the person of Marshal Foch.

There can be no doubt but that the Supreme War Council has met and that the Allied Naval Council continues to fill a great need as a sort of clearing house for the necessarily varied proposals of the several Governments, most of which require cooperation on the part of some other Government, and certainly it should be continued in being until a more forceful control of allied naval effort can be agreed upon and brought into effect.

The United States naval staff representative in Paris is the United States naval liaison officer with the Supreme War Council, and a member of the staff of Vice Admiral Sims is the liaison officer with the secretariat of the Allied Naval Council. The United States naval staff representative in Paris is also liaison officer at the French Ministry of Marine and is at present naval attaché as well.

The naval attaché to Italy maintains naval liaison with the Italian Ministry of Marine and keeps in touch with the United States naval activities in Italian waters.

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ACTIVITIES IN COOPERATION WITH THE BRITISH.

Inasmuch as the British are predominant in naval activity, it is natural to find that a major part of our naval activities are in cooperation with them and controlled by them. In fact, the British have been in position to carry so much of the "naval load" of this war that our first and our principal efforts have been toward taking up a share of that load.

Cooperation has in many cases been carried to such an extent that the coordination necessary for efficiency has developed into practical consolidation. It is pleasing to note that while consolidation is all but a fact, our own naval forces have in every case preferred to preserve their individuality of organization and administration and, as far as feasible, of operations; and that a healthy and friendly rivalry between them and their British associates has resulted in much good to the personnel of both services.

UNITED STATES NAVAL ACTIVITIES IN IRELAND.

The largest single group of naval activities wherein cooperation is effected with the British is that in Ireland, all of them being under the jurisdiction of the commander in chief, coast of Ireland, who has been and is Admiral Sir Lewis Bayly, whose cordial appreciation of the work of our forces has gone far to stimulate the personnel coming under his direction. The chief of staff, destroyer flotillas, and the officer in charge of aviation in Ireland are designated by the British Admiralty as members of the staff of Admiral Bayly.

Battleship division six is based on Berehaven, Ireland, in readiness for the protection of convoys in general and of troop convoys in particular.

Submarine detachment is based on Berehaven, Ireland, and maintain a submarine patrol off the west and south coasts of Ireland. Their service is hard; they

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have had a great deal of work at sea and have cheerfully met every demand made on them.

The destroyers based at Queenstown are the original United States naval force in European waters —a distinction which is an ever-present spur to cheerful efficiency under any and all circumstances and produces results which must be a satisfaction to their superiors.

Subchaser detachment three at Queenstown had only recently arrived, but arrangements for their employment were well in hand, and they were expected to begin operations as soon as the means of basing them had been perfected.

United States Naval Air Stations in Ireland consists of seaplane stations at Whiddy Island, Queenstown (also the main supply and repair base), Wexford, and Lough Foyle, and a kite-balloon station at Berehaven. None of these stations was in operation in mid-September, except that Lough Foyle was partially so, but all were about ready to begin operations and would do so upon the receipt of the necessary planes or pilots or both, all of which were en route. A great deal of the construction has been done by our own personnel, some of the stations having been entirely done by them.

Battleship Division Nine of the Atlantic Fleet, under the command of Rear Admiral Rodman, has constituted the Sixth Battle Squadron of the British Grand Fleet under Admiral Sir David Beatty for nearly a year.

When this division was sent abroad it had, in common with other units of the Atlantic Fleet, suffered in efficiency from the expansion of the Navy, which required reduction in the number of officers and transfers of numbers of men to furnish trained and experienced nuclei for other vessels. Upon reporting in the Grand Fleet, it immediately took its place in the battle line on exactly the same status as other units of the Grand Fleet. The opportunities for gunnery exercises is limited but drill and adherence to standardized methods and procedure as developed in our own naval service have brought this

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division to a satisfactory state of efficiency which continues to improve.

It is pleasing to record that the efficiency of this unit in gunnery, engineering, and seamanship is deemed by the British commander in chief to be in no way inferior to that of the best of the British battle squadrons. In fact, it is perfectly proper to state the belief that our ships are in some respects superior to the British, and perhaps chiefly in the arrangements for the health and contentment of personnel, which have been very thoroughly examined into by the flag officers, captains, and other officers of the Grand Fleet. These ships have also been the subject of much favorable comment in regard to their capacity for self-maintenance, a matter which has been given much attention in our own Navy of late years.

Service in the Grand Fleet is noteworthy by reason of the fact that the fleet is at never less than four hours' notice for going to sea, so that liberty is restricted and whatever is necessary in the way of overhaul and upkeep of machinery must always be planned with a view to assembly in case of orders to sea.

The mine force of the Atlantic Fleet under the command of Rear Admiral Strauss is an independent unit, except that the mine-laying operations are under the jurisdiction of the commander in chief of the Grand Fleet, who has to choose the time when arrangements can be carried into effect to furnish the necessary destroyer escort and heavy covering forces. The arrangements made at home prior to the departure of the mine force appear to have been well considered and thoroughly developed. The mine-laying operations themselves give an impression of efficiency which can only come from thorough preparation and complete understanding of the work.

The cross-channel transport service was brought into being to render indispensable assistance to the British in ferrying United States troops across the channel from England, in whose ports over half of our

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troops were landed from British ships. At the time of inspection late in September four United States vessels were in service, and four more were expected in the course of a few weeks. The vessels in service were superior in capacity to British vessels engaged in the same work and combined with the efficiency of their naval personnel made them the subject of favorable remark by the British transport authorities.

Subchaser detachment one, based on Plymouth, had been operating for some time. This base is to be expanded into a United States naval base. The upkeep of chasers is effected entirely with the resources of the base; operations are initiated by the British commander in chief at Plymouth. A great deal of development work in listening devices is being carried on at and from this base. The work of the subchasers from this base has proved their usefulness up to the limit of their sea-going capacity.

United States naval aviation in England is carried on by cooperation in two British commands.

The United States seaplane station, Killingholme, is under the vice admiral commanding on the east coast of England. It has been in operation for some time and does escort of coastal convoys, escort of mine layers in the southern part of the North Sea, and some reconnaissance work in the direction of the Dutch coast.

The northern bombing group is under the vice admiral commanding at Dover, whose jurisdiction extends to naval aviation units in northern France in the vicinity of Calais and Dunkerque. The day bombing squadrons are manned by marines; the night bombing squadrons by the Navy. There has been some delay in the acquisition of suitable night bombing planes, but their delivery will find all in readiness to go immediately to work. The British prescribe the objectives and designate the available free flying time; the operations themselves are carried out by our own personnel. The seaplane station at Dunkerque has operated successfully

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under the handicap of limited and difficult water area in which to take off and to land.

The assembly, repair, and supply station at Eastleigh was brought into being primarily for the Northern Bombing Group because of the difficulties of transportation to and from the general aviation base at Pauillac. It also does necessary work for Killingholme and for the air stations in Ireland. This base, when visited, was in process of completion and gave every evidence of purpose and capacity to meet all requirements likely to be made of it.

ACTIVITY IN COOPERATION WITH THE FRENCH.

Aside from the cooperation effected by the force commander with the French Ministry of Marine through the naval staff representative in Paris on matters of general policy, actual cooperation is carried on by Vice Admiral H. B. Wilson, commander United States naval forces in France, whose headquarters are maintained in Brest.

It is deemed worthy of special remark that whereas practically all cooperation with the British is effected by operating as units under British control, cooperation with the French is arranged on a basis that leaves to the United States naval forces a very large measure of initiative. This is particularly true in regard to troopships destined to French ports, which are provided with escort and routed in and out wholly from the Brest headquarters which is kept fully informed as to routes and positions of British-controlled convoys and as to locations of submarine activities and has to so adjust routes on and off the coast as to keep clear of both. Three out of eight escort units are provided by United States vessels for the coastal convoy system, which is operated by the French. Unity of purpose and sympathy of understanding have combined to make the handling of cargo convoys on and off the coast a matter of ready adjustment to the general conditions obtaining

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in regard to destination of cargo ships and availability of escort vessels.

At the end of the fiscal year United States naval forces in France are stated to have been escorting troops into France at the rate of 134,000 per month. Since May 1, 1918, the number of troopships and cargo-vessel convoys east and west bound have averaged more than 1 a day, and the number of ships over 200 a month. No convoy of troopships has failed to be met by destroyer escort before entering the area of submarine activity, and no passenger intrusted to the care of the United States naval forces in France has been lost.

The destroyers based on Brest are controlled directly from headquarters at Brest and are at present maintained in readiness for service with the aid of the fleet repair ship *Prometheus* and lately also by the destroyer tender *Bridgeport*. Additional repair shops on shore are in process of completion.

The United States naval repair facilities here as well as elsewhere on the coast of France have to be made use of not only for the upkeep of the United States naval vessels based on the coast, but also for necessary repairs to troopships and cargo vessels, whether naval, Army, or Shipping Board, the guiding idea being to keep the ships moving.

Costal districts in France.—The north and west coasts of France are divided into districts which correspond with the French prefectures maritimes, and the district headquarters are in every case located in the same place as those of the several prefects maritimes. These headquarters are communication and operating centers and provide naturally by arrangement as above described for full and ready coöperation with the French district activities.

The principal ports have assigned to them a port officer whose function in regard to all United States ships is to expedite their "turn around," and in addition, where vessels carrying United States naval armed guards are concerned, to inspect the armed guards and adjust

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such matters as are beyond the capacity or authority of the armed guard commander.

United States naval aviation in France includes all that the title implies, except the northern bombing group mentioned above.

There are eight sea-plane stations, three dirigible stations, and three kite-balloon stations all of which are operated by district commanders in cooperation with the French naval air services in the several corresponding prefectures maritimes. There is also an assembly, repair, and supply base at Pauillac for the general service of all air stations in France and a sea-plane gunnery and bombing training school at Moutchie, both of these activities being directly under the headquarters in Brest.

Of the eight sea-plane stations, five have been in operation for periods varying from 12 to 3 months, and the remaining 3 are now about ready to begin.

Of the three dirigible stations, only that at Paimboeuf has been in operation for any length of time, and is to be used also for training and experimental work.

Of the three kite-balloon stations, only that at Brest is ready for operation. Test and experimental work have been carried on here since August, 1918, in connection with destroyers and yachts.

The assembly repair and supply station at Pauillac has progressed rapidly to completion and is deemed ready to undertake any and all demands that may be made on it.

V. United States Naval Aviation in Europe.

The establishment of United States naval aviation in Europe has been one of the most difficult and involved tasks which have had to be undertaken and brought into effect.

There were arrangements to be made with the French and the British as to locations for stations that would be best adapted for cooperation. There were fur-

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ther arrangements to be made as to the procurement of sites or the taking over of the stations already in operation or in process of construction. The Navy Department had also to be communicated with, largely by cable, as to design, quantities and shipments of material, which upon receipt had to be allocated with a view to completing certain stations as soon as possible while not delaying the progress of the general scheme any more than could be helped.

Delays and mistakes in the shipment of aviation material probably caused more trouble than any other one thing, for when material once arrives in a European port it has been, and still is, a very difficult matter to arrange for coastwise transportation.

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CHAPTER XII

Naval Lessons of the War

THE advance of naval science has increased the complexities of ships and guns. Consequently the problems to be solved are much more intricate and perplexing, both in preparing material and in the development of skill to operate the material. This has emphasised the need of wise naval management. One important lesson of the war is the necessity of good plans, well understood and well carried out.

Every first class navy has its planning department. The duties of this department are deliberative; to draw knowledge from past and current events, to study strategy and tactics as practised now and in the past, at home and abroad; to advise respecting navy yards, bases, and stations; to make recommendations as to the size, composition, and disposition of fleets; to determine the characteristics of speed, armour, and armament for new ships; in short, to make plans both for naval preparations in time of peace and for employment of the fleets in time of war.

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The present war has taught that an effective navy is the logical defence for a country situated like the United States. And by an effective navy is meant, not an impotent navy like that of Spain in 1898, nor a weaker navy like the one surrendered under such humiliating conditions by Germany in 1918, but one adequate to seek and defeat enemy ships long before they can approach our coasts, thus protecting outlying possessions and the sea-borne trade so necessary to our national life; in other words, by an effective navy is meant one which stands for world-wide respect for legitimate American interests; one which is ready, if need be, to defend these interests in all parts of the world.

To determine what should be the composition of such a fleet is a difficult problem and to understand the details requires expert technical knowledge. These technical details are the province of naval experts. The principles, however, from which these details are deduced are not hard to understand, and they are of first importance as the foundation on which the entire structure of naval defence rests.

A fairly definite idea of the work which has to be done in order to make the sea power of the United States an effective guarantor of national security may be arrived at through a discussion

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of the various types of warships, noting briefly their characteristics, their uses, and the proportionate numerical strength of each class required in building up a well-balanced United States Navy. The estimates which follow have to be made in the light of the best obtainable information. They are approximate and subject to modification from time to time to meet new conditions resulting from unforeseen developments. It is always to be remembered that the struggle for control of the seas is an ever-present spur to invention and progress in the development of the weapons used. Old ships are constantly being replaced by new models. Hence the relative value of the respective units may vary somewhat from year to year.

It is a race for the largest stakes that the world has to offer. Control of the seas is the objective, and the nation which gains this control is the one that maintains a fleet able to take and keep the seas in all weathers, and powerful enough to overcome the strongest enemy fleet that it may encounter. Although the particular kinds of ships and guns used in answering the demands of naval strength come and go in continual evolution, still, these broad general demands of sea power remain the same. It is better, therefore, to study the abstract requirements of sea power and to note the

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trend of naval development in meeting these requirements than to rivet attention on the particular types of ships now in use as though they were immutable and incapable of being deposed.

The cornerstone of naval power is the gun; and the measure of a nation's sea power is the strength of her battleship fleet. In spite of the development of the mine and torpedo into important factors, the high-power naval gun is still supreme; so it has been in the past; so it is now; and so it probably will continue to be in the future.

As has previously been pointed out, the only effective naval defence is a fleet strong enough to keep the enemy at a distance. A navy adequate to defend must be sufficiently powerful either to defeat the enemy fleet on the high seas or to contain it in enemy home ports. The main reliance of such an effective navy is the long-range gun.

There is general agreement among experts as to this principle, that the gun is the prime consideration in naval warfare; but the different types installed in the newest ships of the various countries indicate somewhat divergent views as to what is the best design of naval gun. It is obvious that the heavier the projectile and the harder it hits the more will be the damage done. In a general way the principal considerations are: First, accuracy; second, high velocity; third, weight of

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projectile; fourth, capacity of the gun to sustain continuous fire; and fifth, rapidity, or volume of fire. It is thus seen that the size of the projectile is limited by the efficiency of the propelling power and by the structural capacities of the gun and mount. In other words, the heavier the shell, consistent with high velocity, long range, and accuracy, the better; but if the structural durability of the gun is threatened, or if velocity and accuracy are sacrificed in order to throw a heavier projectile, a point is soon reached where damaging power is lost instead of gained.

The varying conditions of sea and visibility under which naval actions may be fought also tend to modify the effectiveness of the different sizes and designs of guns according to the circumstances which may exist at the time of any particular engagement. The gun which would win a fight at close range in misty weather might be defeated by the same enemy gun on a clear day at long range. At the shorter ranges the gun of moderate size might dominate a larger and more powerful enemy gun by greater rapidity and volume of fire. Although this is a contingency to be reckoned with, still, the present tendency is to increase the size of the projectile as fast as improvements in the powder and gun structure permit; and this tendency appears to be one likely to continue in the

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future. We may expect, therefore, that the size of naval guns will increase step by step with scientific improvements in gun construction and powder.

It is always a good thing to reduce a problem to its simplest terms. It is fair to assume that overwhelming naval opinion is in favour of the fleet of battleships as the one great factor in sea power. There is also the same indorsement of gun power as the primary requisite of the fleet of battleships. Keeping these two things in mind we can concentrate on the main terms of naval strength without confusing the discussion by introducing the complex details of the modern battleship. The problem of adequate naval defence is to provide seaworthy mobile gun platforms capable of mounting and maintaining a superior number of powerful guns in position against the enemy.

The maintenance of the guns and the maintenance of their service, which includes all the material and personnel of the ship, must necessarily be contained in the gun platform—and conditions on the sea arbitrarily divide the guns into groups mounted on each battleship platform. Thus the problem of the battleship is reduced to finding the best possible group of guns, self-maintained upon a properly mobile platform, that will act in unison

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with other similar gun platforms. Protection of the gun and its platform increases the efficiency of the gun on the sea. Consequently a battleship should be the best possible group of guns, armoured, and mounted upon an armoured gun platform that is self-maintaining and sufficiently mobile. Thinking in these terms, the three component factors of armament, armour, and speed remain in their right proportion.

Since the gun is the prime consideration, the other characteristics of a battleship depend upon what design of ship is considered most serviceable for the purpose of the gun. Some idea of the requirements of a battleship may be had by keeping in mind that it is desirable to mount as many guns in one ship as is consistent with having a homogeneous fleet possessing tactical mobility, adequate speed, long cruising radius, seaworthiness, habitability, and protection from the blows of the enemy whether delivered from above or below the water. It requires careful weighing of proportionate advantages and disadvantages to harmonise these characteristics into the combination which will produce the best possible type of battleship.

The advantages of ships of large tonnage over smaller vessels are many; more heavy guns can be carried, the platform is steadier, the cruising ra-

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dius is larger, the habitability and seaworthiness are better, and more effective means of protection can be installed. On the other hand, there is a limit of size beyond which the advantages are outweighed by the disadvantages; the question of expense enters, and any very large increase in the size of warships might be argued against on the grounds that it would be like putting "too many eggs in one basket." Manœuvring abilities are adversely affected by very large displacements, and the depths of the various waterways as well as the accommodations of canals and dry docks impose definite limits to the size of ships.

On the whole it may be expected that the tendency to increase the tonnage of battleships will continue for some time. It would also appear an improvident policy for any country to increase the size of its battleships by radical changes of large increments, because this would entail expense and a bad effect upon the homogeneity of the fleet. These objections might easily outweigh the advantages gained. It may be assumed, therefore, that future increase in the size of warships will be a gradual growth, with a probably decreasing acceleration.

The fleet of battleships alone does not constitute a navy. Scouts, destroyers, submarines and other auxiliaries are needed. In order that the

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United States may make good defence of her great surrounding oceans it is particularly important that her battle fleet should have a far flung service of scouts to give information of the movements of the enemy. An adequate air service, including airships, aeroplanes, and captive balloons, is, for obvious reasons, indispensable to the modern fleet. Destroyers are needed to attack and confuse the enemy ships, and at the same time guard their own large ships from similar attacks. Submarines are necessary to help defend the coasts and also to operate as a tactical sub-division of the fleet. Mine layers are needed to harass and menace enemy ships, while mine sweepers and patrols are required to search for enemy mines and submarines. In addition to these combatant units, auxiliaries, including transports, repair ships, hospital ships, and supply ships, are essential to the life and vigour of a fighting navy.

The floating instruments of sea power, moreover, must be backed by suitably situated and properly defended permanent bases and navy yards in which ships may seek rest and rehabilitation. Strategically situated island possessions are also needed for naval bases, by which lines of communication may be kept open to such tempo-

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rary advance bases as the requirements of a particular campaign may demand.

It is thus seen that, while relative naval power is primarily measured by the strength of the respective battleship fleets of the various naval powers a navy should also possess these necessary auxiliaries in order to attain its maximum effectiveness. The first-mentioned auxiliaries, the scouts, are a most important adjunct.

The battle cruiser is the most powerful type of scout, and in addition to high speed has great offensive powers, together with endurance and a moderate protection of armour. While the chief function of this type is to get information, it has, because of these offensive and defensive characteristics, additional uses. The battle cruiser may fight for information and break through a hostile screen; she may support the lighter craft of her own fleet, beat back enemy scouts and guard the main body from surprise; she may be used to protect national sea routes and attack those of the enemy; and in battle she may operate as a fast wing and take a position favourable for using both guns and torpedoes.

But the chief utility of the battle cruiser is now held to be that of a scout and raider, possessed of the power to dominate any such craft of other type. Yet the gain of this advantage means

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that one unit has been built instead of several—and, as it would appear that a number of scouts is more useful than one individual, except in unusual conditions, the wisdom of building one battle cruiser instead of several scouts is questionable.

The information service of a fleet requires a large number of scouts, and in order to produce them without undue cost the light cruiser has been developed, small in size and lightly armoured, but with adequate speed and cruising radius for scout duty. As before stated, the unarmoured light cruiser, carrying torpedoes and intermediate guns, may be regarded as a development of the destroyer; it is larger, more habitable, carries larger guns, and is more useful as a scout. The ultimate development of the light cruiser would appear to be a larger unarmoured ship with great speed, carrying torpedoes and a few of the most powerful naval guns. Such a ship could outrun anything it could not fight, and it would take almost an equal number of battle cruisers to deny information sought by a group of these big-gun fast scouts making determined efforts to break through or to go around the opposing battle cruisers. The thin armour of the battle cruiser would afford protection against the small guns of light cruisers, but would be of no avail against the heavy guns of this new type of scout. In fact,

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the lessons of the war give good ground for belief that such thin armour, particularly in turrets, might increase the chances of disaster, if hits were made by heavy guns.

There has been talk of such a ship to be developed in this country, its characteristics being extreme speed and maximum gun power without armour protection. Those that favour this type hold that, just as the armoured cruiser fell into discredit, so will the battle cruiser fall into discredit upon the advent of this type of scout. The idea is that the battleship is for the main strength of the fighting line, having extreme gun power and extreme endurance and armour protection; that the logical auxiliary of such a battle fleet is a class of ships having extreme speed and extreme gun power without armour protection; that any compromise between these two, such as a battle cruiser, is unsound from the essential standpoint of getting best results from money expended.

The destroyer, a familiar and popular fighting ship, the usefulness of which the experience of the present war has clearly demonstrated, displaces about 1,000 tons, has no armour protection, carries torpedoes and small-calibre guns, and possesses high speed, quick manœuvring qualities, and sufficient radius to permit cruising with the fleet. Destroyers have a wide range of employment, in-

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cluding scouting, patrolling, convoying, and fighting. They are almost indispensable to the battleship fleet. While cruising both during the day and at night the destroyers help screen the capital ships and are ready for any kind of emergency duty.

When the time of battle comes it would be hard to overestimate the value of destroyers in making attack on the enemy capital ships, in breaking up the projected attacks of enemy destroyers, in delivering the deathblow to crippled enemy ships, and making smoke screens for tactical purposes, either to confuse the enemy or to envelop and protect any of their own ships which may happen to be hard pressed.

An excerpt from the report of the Naval General Board dated Nov. 17, 1914, reads as follows: "After mature consideration of all the elements involved the General Board concluded that a well-balanced fighting fleet for all purposes of offence or defence calls for a relative proportion of four destroyers to one battleship."

In addition to this proved value as an auxiliary of the fleet, the destroyer is now recognised as the best weapon against the U-boat. So evident is this that the demand for these craft is most urgent, and it may be said that seldom has any type

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of naval construction won so deserved a recognition in the actual test of warfare.

Auxiliaries less distinctively combative, but still necessary to the maintenance of a fighting navy, include colliers, oil-fuel ships, repair ships, mother ships for submarines and aircraft, transports, and hospital ships. The characteristics and uses of these vessels are obvious, and the respective number needed may be determined by logistical calculations. Lesser naval units, including mine layers, mine sweepers, patrol ships, and submarine chasers, also have work to do in modern warfare and must be provided for in adequate numbers.

In making a brief survey of the naval activities of the war, it is seen that the submarine was of no great value to the superior navies controlling the seas, but proved practically the most effective naval weapon of the inferior fleets. When used against the enemy battle squadrons it influenced strategy and tactics and scored successes in sinking some of the older men-of-war, but generally speaking produced no very important results. When used against merchant ships the submarine was unable to attain effectiveness while complying with the rules and usages of international law, but by resorting to unscrupulous methods it became a dangerous commerce destroyer

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and as such has taken a prominent part in the war.

Experience has shown that the chief tactical value of the submarine in actual naval warfare is for defence, to hold the enemy at a distance. The fleet submarine has also demonstrated an offensive value which may be useful in attaining a tactical advantage. It may be inferred, therefore, that the United States needs submarines both to help defend her coasts and to operate as a tactical subdivision of the fleet.

The evolution of the submarine appears to be towards the submersible battleship; but the consensus of naval opinion at present seems to be that a super-submersible capable of navigating under the water and also strong enough to fight battleships on the surface involves an almost prohibitive cost, which would be out of proportion to the advantages gained. By increasing the tonnage of the submarine its mechanical difficulties are aggravated. On the other hand, the large tonnage of the surface battleship is like a reserve of wealth, which may be expended in any desirable way; if under-water attack is a serious menace to the battleship some of this tonnage can be drawn upon to supply suitable protection, such as a series of outer and inner bottoms so constructed and subdivided as to make the ship practically nonsinkable;

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or, if attack from the air is dangerous, reserve tonnage may be drawn upon for aero defence—and so on. In estimating the value of the submarine in wars to come it would appear safe, therefore, to assume that in future struggles for control of the seas the rôle of the submarine will always be secondary to that of surface ships.

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APPENDIX

Comparative Strength of Navies

Excerpts from a compilation by T. G. Frothingham, reprinted by courtesy of "Current History."—Table prepared and arranged by C. H. Foster, U. S. N. A.—Table published by the Office of U. S. Naval Intelligence.

THE four deck plans, Fig. 1, Fig. 2, Fig. 3, Fig. 4, show practically all the variations in the construction of dreadnoughts, and also of battle cruisers. Keeping them in mind will help in the following estimate of the navies of Great Britain, Germany, United States, France, Japan, Russia, Italy, and Austria-Hungary. These will be given in their order of tonnage.

The United States Navy has taken a leading part in the development of the modern naval gun. This has resulted in a gun with an increased length in proportion to its calibre, and a high muzzle velocity without undue erosion. Our 12-inch naval gun, increased from 45 calibre to 50 calibre, with a projectile of 870 pounds and an initial velocity of 2,950 foot-seconds, is the most powerful naval gun of its class. Our next step, the 45-calibre 14-inch naval gun, has a projectile of 1,400 pounds and initial velocity of 2,600 foot-seconds. This gun has been increased to 50 calibre for the three new dreadnoughts of the *Mississippi* class. For the later classes of dreadnoughts authorised by Congress a 16-inch

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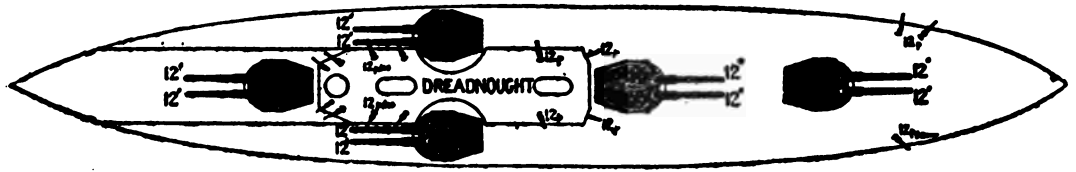

FIG. 1—DREADNOUGHT (BRITISH, 1906)

Name ship of class.

Ahead: 6—12 in. Broadside: 8—12 in. Astern: 6—12 in.

Four of the British first line battleships have this arrangement of turrets.

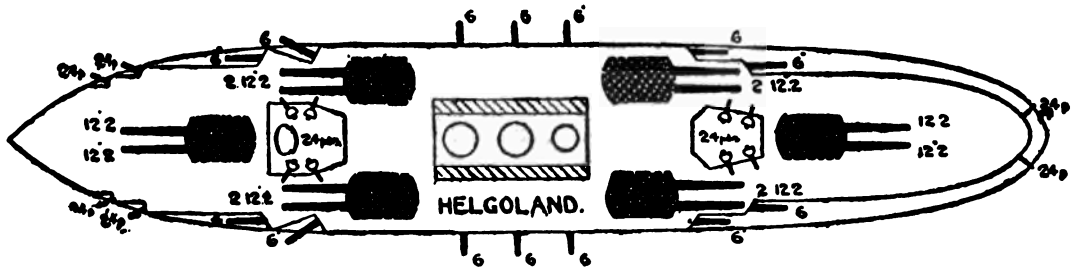

FIG. 2—HELGOLAND (GERMAN)

Ahead: 6—12.2 in. Broadside: 8—12.2 in. Astern: 6—12.2 in.

First arrangement of turrets on German dreadnoughts. Note how the turrets hamper one another at different angles of fire. Eight German dreadnoughts have this arrangement of turrets.

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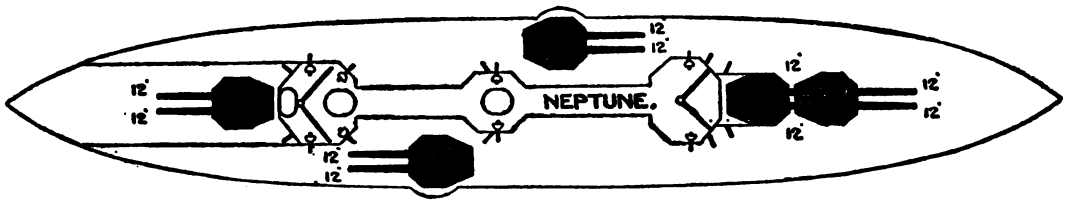

FIG. 3—NEPTUNE (BRITISH, 1908)

Ahead: 6—12 in. Broadside: 10—12 in. Astern: 8—12 in.

Shows echelon arrangement of turrets.

Three British and Four German dreadnoughts, and British and German battle cruisers have this echelon placing of the turrets.

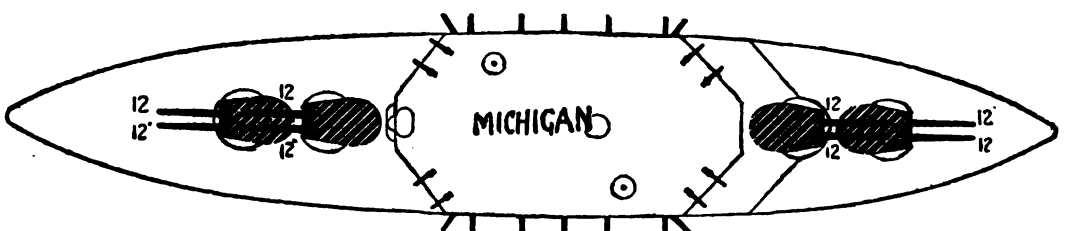

FIG. 4—MICHIGAN (UNITED STATES)

Ahead: 4—12 in. Broadside: 8—12 in. Astern: 4—12 in.

American design of turrets aligned over the keel.

The Michigan was designed in advance of the nameship *Dreadnought*, though the latter was the first in commission. This keel line of turrets was finally adopted by all nations.

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gun has been designed. These guns will be the standard of comparison for armaments when considering the foreign navies.

THE BRITISH NAVY

The British Navy is much the strongest in the world, because, to retain control of the seas, Great Britain has made it her policy to maintain a navy powerful enough to fight any two naval powers that might combine against her. This is the origin of the term "a two-power navy," now so frequently used in our country.

The British strength, in the recognised first essentials of sea power, known to be built and building is as follows:

BRITISH NAVY—SHIPS BUILT AND BUILDING

Dreadnoughts	38[1]
Predreadnought battleships	31
Battle cruisers	7

[1] 35 ships, regular programme, 2 Turkish and 1 Chilean (building in England) aken over early in the war.

Of the 38 dreadnoughts built and building the following is the list of recent construction in the programme, with the dates of completion originally planned for each ship:

BRITISH NAVY—NEW CONSTRUCTION—DREADNOUGHT TYPE

Compl'd in—	Name	Displacement	Main armament	Speed
1914	Queen Elizabeth	27,500		25 0
1914	Warspite	27,500		25.0
1915	Barham	27,500	8 15-inch	25 0
1915	Valiant	27,500		25 0
1915	Malaya	27,500		25 0
1915	Royal Sovereign	25,750		22 0
1915	Royal Oak	25,750		22 0
1916	Ramillies	25,750	8 15-inch	22 0
1916	Resolution	25,750		22 0
1916	Revenge	25,750		22 0
1917	One Ship	27,500	8 15-inch	25 0
1917	Renown	25,750		
1917	Repulse	25,750	8 15-inch	22.0
1917	Resistance	25,750		

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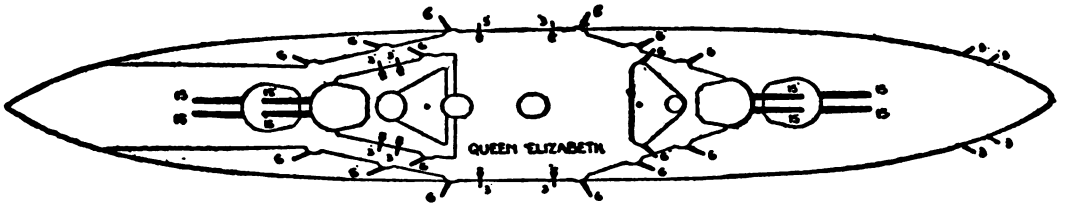

FIG. 5—QUEEN ELIZABETH (BRITISH BATTLESHIP, 1914)
Displacement, 27,500 tons; main armament 8—15 inch; speed 25 knots.

FIG. 6—INVINCIBLE (BRITISH BATTLE CRUISER, 1908)
Displacement, 17,250; main armament 8—12 inch; speed, 26 knots.

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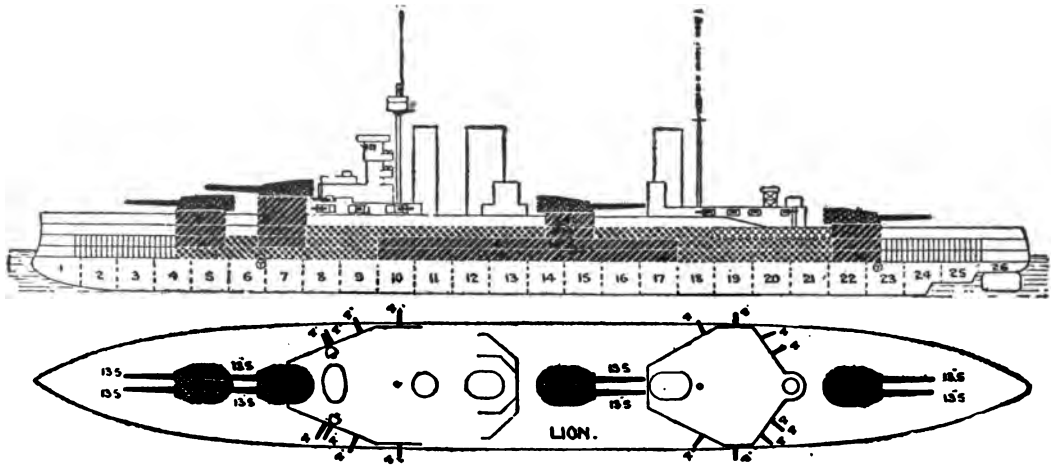

FIG. 7—LION (BRITISH BATTLE CRUISER, 1911)
Displacement, 26,350; main armament, 8—13.5 inch; speed, 28.5 knots.

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The dreadnought strength of the British fleet in the battle of Jutland (May 31-June 1, 1916) is authoritatively given as 29. In view of this, it seems improbable that at the date of the battle Great Britain had made any great additions to the dreadnoughts in her known programme. Great Britain is known to have increased her dreadnoughts by the one Chilean and two Turkish warships taken over early in the war.

The following is the list of British battle cruisers at the time of the battle, with dates of completion:

BRITISH NAVY—BATTLE CRUISERS BEFORE THE BATTLE OF JUTLAND

Compl'd in—	Name	Displacement	Main armament	Speed
1908	Indomitable	17,250	8 12-inch	26
1908	Inflexible	17,250		26
1908	Invincible	17,250		26
1911	Indefatigable	18,750	8 12-inch	25
1911	Lion	26,350	8 13.5-inch	28.5
1912	Princess Royal	26,350		28.5
1912	New Zealand	18,800	8 12-inch	25.0
1913	Australia	19,200		26.0
1913	Queen Mary	27,000	8 13.5-inch	28.0
1914	Tiger	28,500	8 13.5-inch	28.0

There were nine battle cruisers with the British fleet in the battle of Jutland, and it is known that every one of these is in the list above given. Of these, three battle cruisers were lost in this battle, *Indefatigable*, *Queen Mary*, and *Invincible*, leaving the present total seven, as given in the table.

In the months that have followed the battle it is probable that there has been an increase of the fleet of dreadnoughts, but, realising the other demands on the British yards, it is doubtful if the increase has been abnormal.

Great Britain has been obliged to increase greatly her fleet of light cruisers, destroyers, patrols, &c., to meet

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the submarine danger. It is known that a great deal of her building capacity has been used in construction of the monitor type. It has recently been given out that the British Government is building a large number of cargo ships, and the demands on the yards for repairs of the fleet, for supply and transport service, &c., must also be considered. Add to this the great drain on British labour to provide munitions, and the indicated lack of great increase to the fleet would be explained. Consequently, it would be reasonable to conclude that in 1917 the British fleet of dreadnoughts does not greatly exceed the total given in the regular building programme. Undoubtedly there has been a continuance of the future building programme, and many ships have been laid down.

From the deck plan of the *Queen Elizabeth* (Fig. 5) it will be seen that the placing of the turrets follows the design of U. S. S. *Michigan* (Fig. 4). All of the fourteen ships given in the list of new construction have this arrangement of turrets. Sixteen of the remaining dreadnoughts also have their turrets aligned over the keel. The other seven have the less efficient designs of the *Dreadnought* (Fig. 1) and *Neptune* (Fig. 3).

Great Britain originated the battle cruiser. The plans show the design of the *Lion* class (Fig. 7) and the earlier *Invincible* class (Fig. 6). It will be seen in the list of recent construction that Great Britain did not add to her programme any battle cruisers for completion after 1914. The five 25-knot dreadnoughts (*Queen Elizabeth* class) were for 1914 and 1915. After that for 1916 and 1917 there is only one 25-knot ship—all the rest are 22-knot.

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For armament eleven dreadnoughts carry 12-inch guns, twelve 13.5-inch, and fourteen 15-inch. The Chilean warship, now called the *Canada*, carries 14-inch guns. The English 15-inch projectile is very heavy, weighing some 500 pounds more than the American 14-inch projectile, but the initial velocity of this heavier shell is much less than that of our 14-inch.

It is rumoured, and it is very probable, that still larger English naval guns have been designed—even as large as 18-inch. But, in view of the British programme of construction, it seems most likely that such guns are for the monitors.

Great Britain has built floating batteries of the monitor type. These are for use against shore guns and in places where ships are exposed to torpedoes and mines. There is much mystery maintained about them, but it is known that some have very heavy guns, and that they have a specially devised cushioned protection against mines and torpedoes.

In all the auxiliaries of a great fleet the British Navy is well equipped—and when one realises that this means cruisers, scouts, supply ships of all kinds, destroyers, submarines, aircraft, &c., with the additional burden of patrols, mine sweepers, and transport service, all of which are necessary to maintain British control of the seas, the total is astonishing.

THE GERMAN NAVY

Germany became the second naval power of the world in the years that succeeded the laying down of the *Dreadnought* (1906). This was a time of great activity

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in the foreign navies. In 1907 Germany had laid down four dreadnoughts, in 1908 four, in 1909-10 five, in 1911 four. In the same years the United States Navy had been restricted to the two-battleships-a-year policy—and had yielded second place to Germany.

The known strength of the German Navy is:

GERMAN NAVY—BUILT AND BUILDING

Dreadnoughts	20
Predreadnought battleships	19
Battle cruisers	7[1]

[1] Six, regular programme; one battle cruiser building taken over from Greece.

As in the case of the British Navy, absolutely no German naval information has been given out since the start of the war. Concerning the German Navy also sensational stories of increased strength have been circulated. It was related that the ships were being rearmed with new guns of great power, that there had been secret construction, and that an unexpected strength had been developed, but at the battle of Jutland it was the same story. Germany brought out her whole fleet—and there was no new element of strength.

The twenty German dreadnoughts in the known programme consist of thirteen ships, and the following new construction is given with proposed dates of completion:

GERMAN NAVY—NEW CONSTRUCTION—DREADNOUGHT TYPE

Compl'd in—	Name	Displacement	Main armament	Speed
1914	Grosser Kurfürst	25,388	10 12-inch	22.0
1914	Markgraf	25,388		22.0
1914	König	25,388		22.0
1915	Kronprinz	25,388		22.0
1916	"T"	28,500	8 15-inch	23.0
1916	Ersatz Wörth	28,500		23.0
1917	Ersatz Fr'd'h III	28,500		23.0

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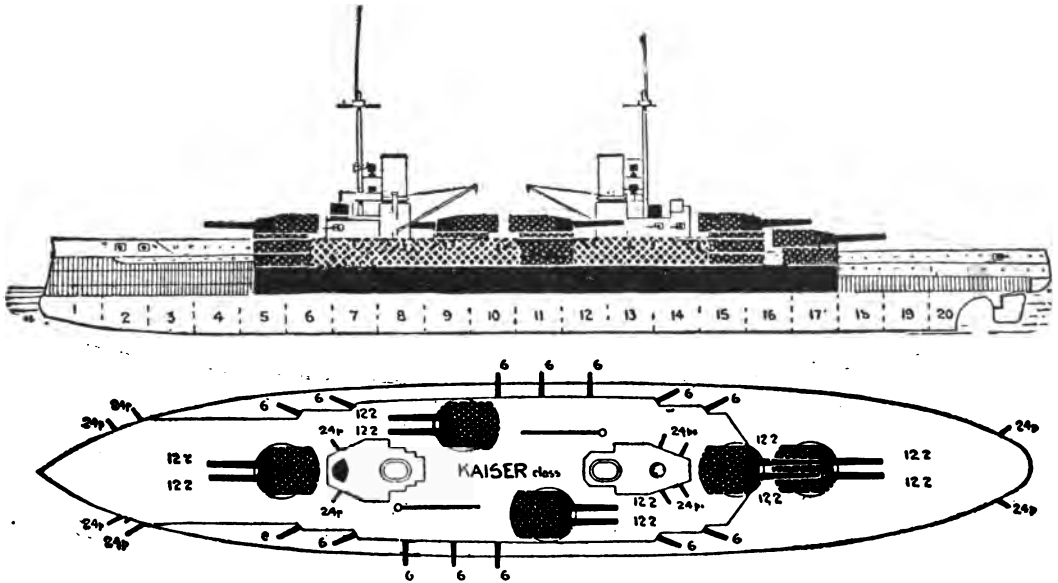

FIG. 8. KAISER (GERMAN BATTLESHIP)

Main armament, 10—12.2 inch.

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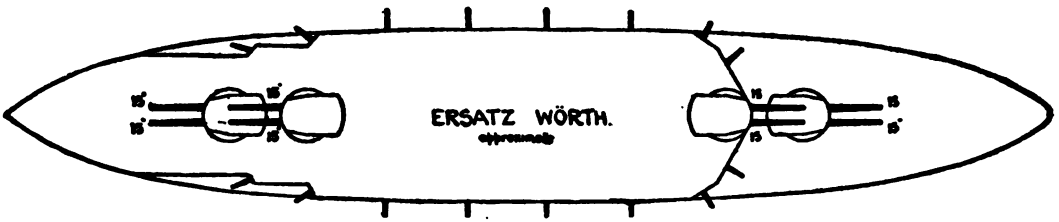

FIG. 9—ERSATZ WÖRTH (GERMAN BATTLESHIP, 1916)
Displacement, 28,500; Main armament, 8—15 inch; speed, 23 knots.

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The German battle cruisers in the known building programme were as follows at the date of the battle of Jutland:

GERMAN NAVY—BATTLE CRUISERS

Compl'd in—	Name	Displacement	Main armament	Speed
1910	Von der Tann	19,100	8 11-inch	27.6
1911	Moltke	22,632	10 11-inch	28.4
1913	Seydlitz	24,385	10 11-inch	29.2
1914	Derfflinger	28,000	8 12-inch	27.0
1915	Lützow	28,000	8 12-inch	27.0
1916	Ersatz Hertha	28,000	8 12-inch	27.0
1917	E'tz Vic'a Louise	28,000	8 12-inch	27.0

To the above must be added the battle cruiser *Salamis*, building for Greece, which the Germans took over early in the war.

In the battle of Jutland the German High Seas Fleet is given as sixteen dreadnoughts, five battle cruisers, and six predreadnoughts. The battle cruiser *Lützow* was lost in the battle. The details of the remaining ships are shown in the above list.

In the months that have followed Jutland it is improbable that any great addition has been made to the building programme of the German fleet, but Germany has built some new light cruisers, some destroyers and numerous air craft. There must have been a strong tax on their yards for repairs; the original ships of the programme were to be completed, and there must have been a great effort to turn out submarines for their latest offensive. As in the case of the British fleet, it is probably safe to conclude that there has been no abnormal increase of their fighting fleet.

The German dreadnoughts are known to be well built and able ships, but in many of them the arrangement of the turrets hampers the guns. Eight dreadnoughts have the design of the *Helgoland* (Fig. 2), five (*Kaiser*

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class, Fig. 8) have the echelon arrangement shown in the diagrams, and seven have the turrets aligned over the keel.

The German predreadnought battleships, although they are valuable assets to the German Navy, are not as good as the corresponding British ships and American ships of the same date.

Of the German dreadnoughts four carry 11-inch guns, thirteen carry 12-inch guns, and three 15-inch guns. These last are the ships of the *Ersatz Wörth* class (Fig. 9) in the list given, and, from the evidence of Jutland, it is doubtful if all are completed. These twenty German dreadnoughts built and building carry forty-eight 11-inch, one hundred and thirty 12-inch, and, when the three *Ersatz Wörths* are completed, twenty-four 15-inch guns.

THE UNITED STATES NAVY

The United States Navy has been the leader in the development of the "all-big-gun" battleship of to-day, called the "dreadnought." From the first single-turret ship, the *Monitor*, to the two-turret monitors, then to the U. S. S. *Roanoke* (Fig. 10)—these were the three great strides in such ships designed by the United States Navy in the epoch-making times of the civil war, which led to the plan of big guns in turrets aligned over the keel.

In the recognised first essentials of sea power the strength of the United States Navy is given as follows:

UNITED STATES NAVY—BUILT AND BUILDING

Dreadnoughts	17
Predreadnought battleships	21

The United States Navy has no battle cruisers.

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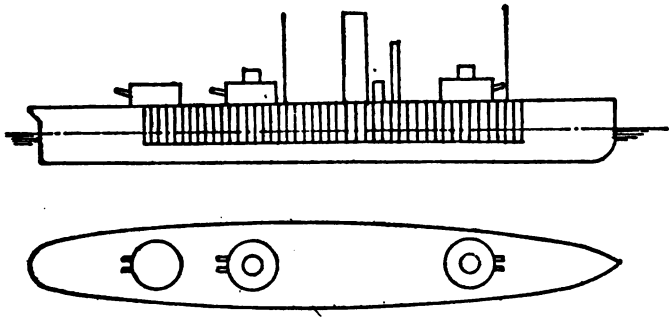

FIG. 10—U. S. S. ROANOKE, 1863
(Sea-going Turret Vessel)

Armament, two 15-inch, two 11-inch, two 150-pdr. rifled guns. Armor, 1½ in. wrought-iron deck in two layers of ¾ in. each, and side armor, 4½ in. at top. 3½ in. at bottom; wrought-iron plates 4 ft. below and 6 ft. above water-line.

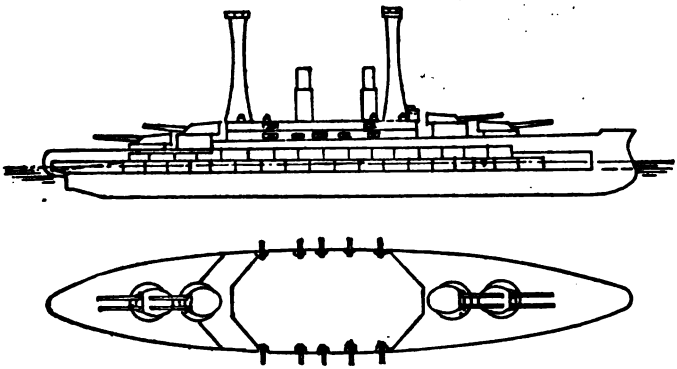

FIG. 11—U. S. S. MICHIGAN, 1909

Armament, eight 12-in. 45 cal. B. L. R., twenty-two 3-in. 50 cal. R. F., four 3-pdr. saluting. Armor belt, 10 in., 11 in., 12 in., at top; 8 in., 9 in., 10 in., at bottom. Casemate, 8 in. at top; 10 in. at bottom. Side plating forward and aft, 1½-in. nickel steel. Protective deck forward, 1½-in., aft, 3-in. nickel steel.[1]

[1] By courtesy of U. S. Naval Institute Proceedings.

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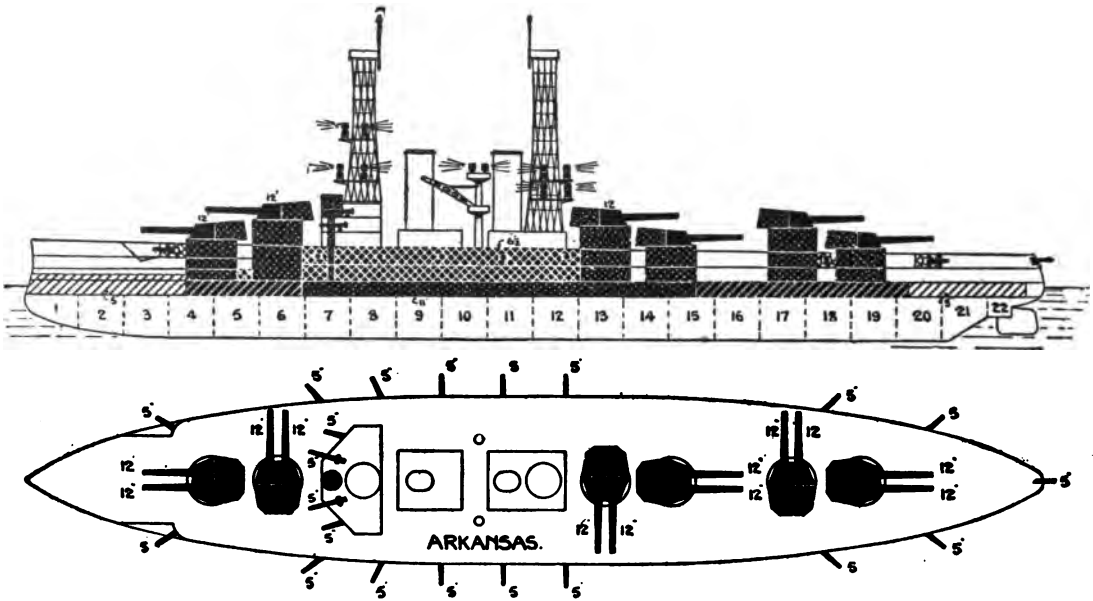

FIG. 12—U. S. S. ARKANSAS

Length: 554 ft.
Ahead: 4—12 in.; 6—5 in.

Beam: 93¼ ft.
Broadside: 12—12 in.; 11—5 in.

Mean draught: 28½ ft.
Astern: 4—12 in.; 6—5 in.

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As the object of this article is to give the strength of the navies at corresponding stages of their building programmes, two of the dreadnoughts should be omitted from this list, the *Tennessee* and *California*, as their percentage completed is small. The three ships of the class of the *Mississippi*, recently launched, should be included on this basis, as these three ships might be hurried to completion. Consequently, the dreadnoughts in the corresponding programme of the United States Navy should be fifteen.

In Fig. 13 is given the plan of U. S. S. *Pennsylvania*. As will be seen, this ship is the developed design of the *Michigan*, with three guns in each turret instead of two. The recent building programme of our first-line dreadnought battleships is given below:

Comp'd in—	Name	Displacement	Armament		Speed Knots
1912	Arkansas	26,000	12	12-in	21.05
1912	Wyoming	26,000			21.22
1913	Texas	27,000	10	14-in	21.0
1914	New York	27,000	10	14-in	21.0
1915	Nevada	27,500	10	14-in	20.5
1915	Oklahoma	27,500			20.05
1916	Pennsylvania	31,400	12	14-in	21.05
1916	Arizona	31,400			
	Idaho	32,000			
	Mississippi	32,000	12	14-in	21.0
	New Mexico	32,000			

The twelve dreadnoughts completed of the battle fleet carry sixty-four 12-inch guns and sixty-four 14-inch guns. The three ships of the *Mississippi* class will add thirty-six 14-inch guns to this total.

In addition to these, the two ships of the *Michigan* class carry sixteen 12-inch guns. Of the other pre-dreadnought battleships six carry twenty-four 45-calibre 12-inch guns, and eight carry thirty-two 40-calibre 12-inch guns.

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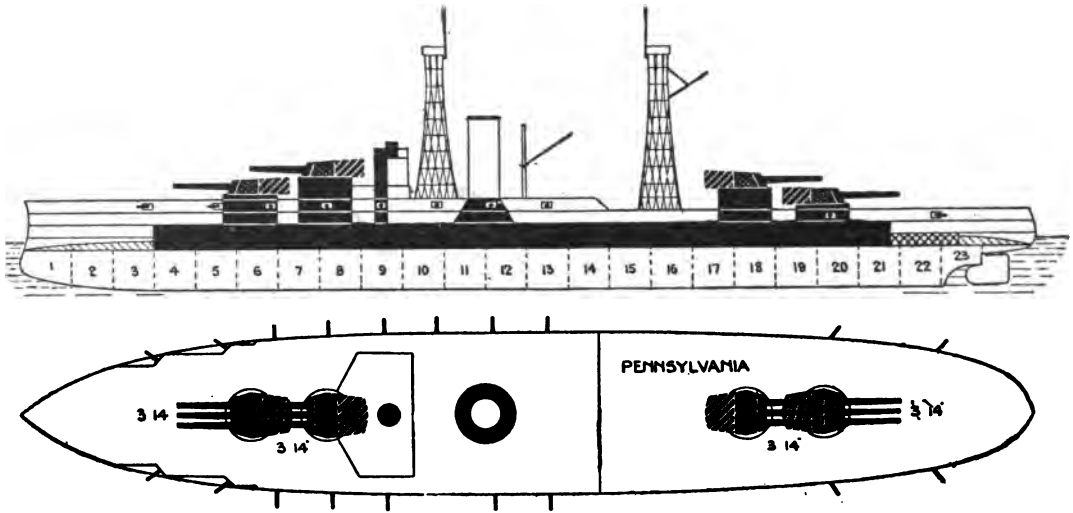

FIG. 13—U. S. S. PENNSYLVANIA

Length: 600 ft. **Beam: 97 ft.** **Mean draught: 28 5/6 ft.**
Ahead: 6—14 in. **Broadside: 12—14 in.** **Astern: 6—14 in.**

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UNITED STATES VESSELS BUILDING AND AUTHORISED

Name	Displacement	Speed	Main battery	Where building
Battleships				
Tennessee	32,300	21	12 14-in.	New York
California	32,300	21	12 14-in.	Mare Island
Colorado	32,600	21	8 16-in.	Camden
Maryland				Newport News
Washington				Camden
W. Virginia				Newport News
No. 49	Characteristics not determined			
50				
51				
52				
53				
54				
Battle Cruisers				
No. 1	35,000	35	10 14-in.	
2				
3				
4	Characteristics not determined.			
5				
6				
Scout Cruisers				
No. 4				Seattle
5	7,100	35		
6				
7				
8				
9	Characteristics not determined			
10				
11				
12				
13				

From the foregoing table it will be seen that a great increase of the United States Navy has been authorised. As this is for future years it has nothing to do with the present comparison. It should be added that many destroyers are also being rushed to completion.

THE FRENCH NAVY

The French Navy was for many years second only to the British Navy, but in the abnormal increase from 1906 to 1911 there was no effort made to keep pace with Great Britain and Germany—and this was probably wise from the peculiar situation of France. The strength of the French Navy in the main accepted essentials is as follows:

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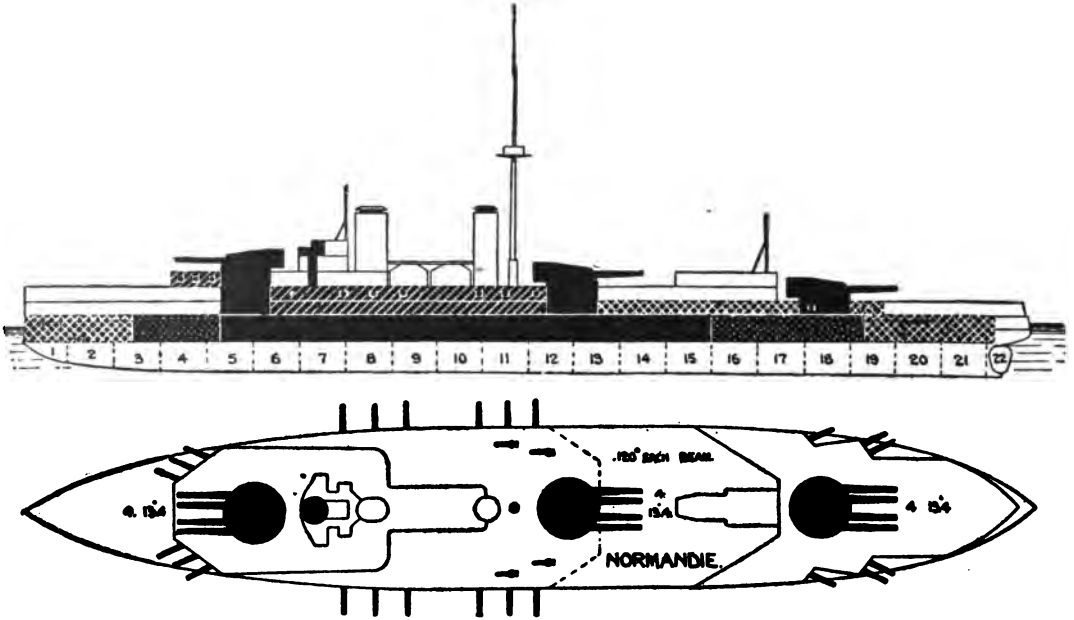

FIG. 14—FRENCH DREADNOUGHT NORMANDIE

Length: 574 ft. Beam: 92 ft. Maximum draught: 28¼ ft.

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FRENCH NAVY—BUILT AND BUILDING

Dreadnoughts	12
Predreadnought battleships	17

The French Navy has no battle cruisers.

The known recent building programme is as follows:

Comp'd in—	Name	Displacement	Armament	Speed Knots
1915	Bretagne	23,172	10 13.4-inch	20.0
1915	Loraine	23,172		
1915	Provence	23,172		
1916	Normandie	24,828		
1916	Languedoc	24,828		
1916	Flandre	24,828	12 13.4-inch	21.5
1916	Gascogne	24,828		
1917	Bearn	24,828		

As will be seen from the plans of the *Normandie* given in Fig. 14, the French have three turrets aligned over the keel—but with four guns in each turret. No other navy has adopted this arrangement of guns. The French have always designed and built good battleships—and French ships have been of great use in the Mediterranean and elsewhere. It is now known that equality in heavy artillery on the western battle front was only established by use of the French naval guns (Fig. 15).

In auxiliaries of the battle fleet France is well equipped. Her submarines in particular are known to be very good, although, as has been the case with the British Navy, there has not been much chance to use them.

THE JAPANESE NAVY

The strength of the Japanese Navy in the first essentials in the known building programme is as follows:

JAPANESE NAVY—BUILT AND BUILDING

Dreadnoughts	6
Predreadnought battleships	13
Battle cruisers	4

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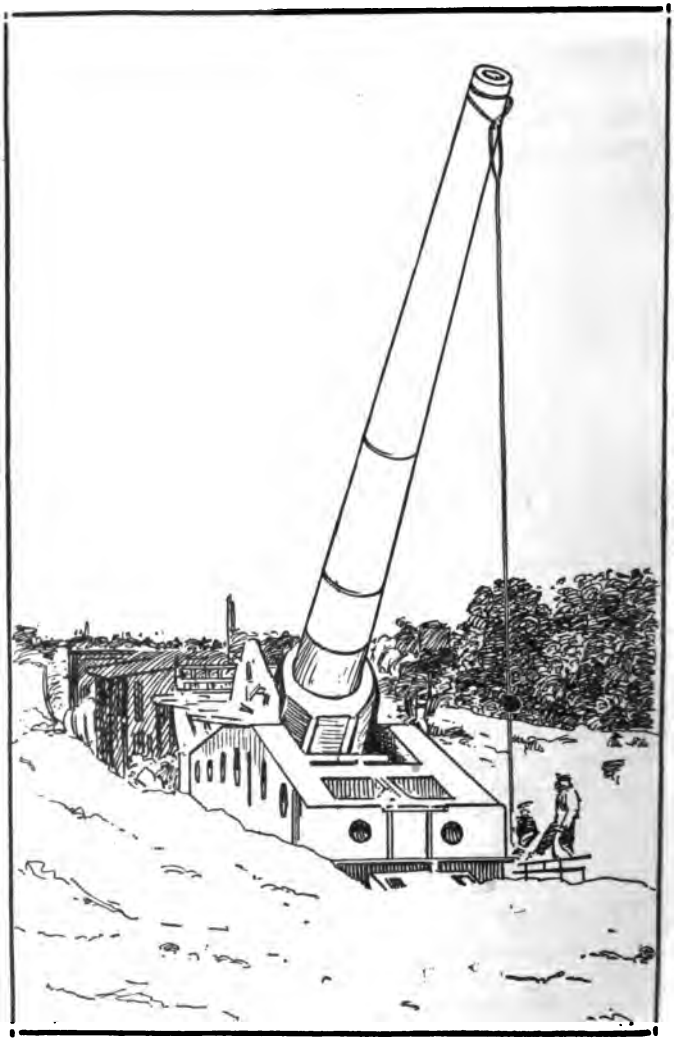

FIG. 15—FRENCH NAVAL GUN AT WESTERN FRONT.

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The recent building programme, so far as known, is as follows:

DREADNOUGHTS

Comp'd in—	Name	Displacement	Armament	Speed Knots
1912	Kawachi	20,800	12 12-inch	20.5
1912	Settsu	20,800		
1915	Fu-So	30,600	12 14-inch	22.0
1916	Yamashiro	30,600		
1916	Ise	30,600		
1917	Hinga	30,600		

BATTLE CRUISERS

1913	Kongo	27,500	8 14-inch	28.0
1914	Hiyei	27,500		27.0
1914	Kirishima	27,500	8 14-inch	28.0
1915	Haruna	27,500		28.0

The first two dreadnoughts have the arrangement of the turrets of the German *Helgoland* class (Fig. 2). The four dreadnoughts of the *Fu-So* class (Fig. 16) are formidable battleships which have followed the design of the U. S. S. *Arkansas* (Fig. 12). As a matter of course Japan, like the other nations at war, has given out no naval information since she entered the war. Undoubtedly there has been a great increase of the Japanese building programme, but it is not probable that any new capital ships are ready for service.

As in the case of the British Navy, it will be noted that the Japanese naval programme did not include battle cruisers for completion later than 1915. Whether or not other ships of this class have been recently laid down is not known. The four battle cruisers in the Japanese building programme probably make up the most powerful squadron of their class afloat to-day.

In all the auxiliaries of the battle fleet it may be assumed that the progressive Japanese are well equipped.

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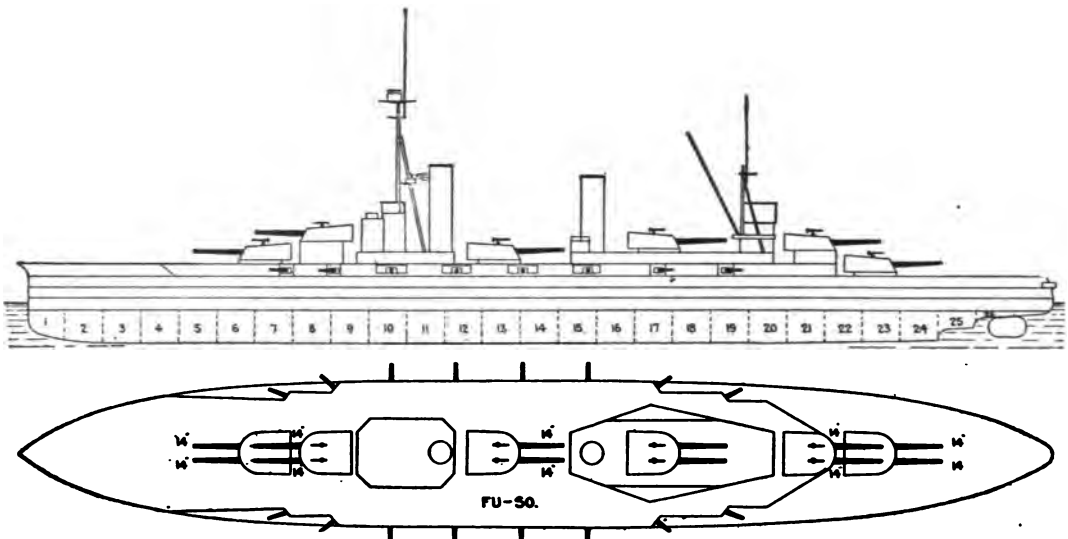

FIG. 16—JAPANESE DREADNOUGHT FUSO

Length: 673 feet

Ahead: 4—14 in. Broadside: 12—14 in. **Astern:** 4—14 in.

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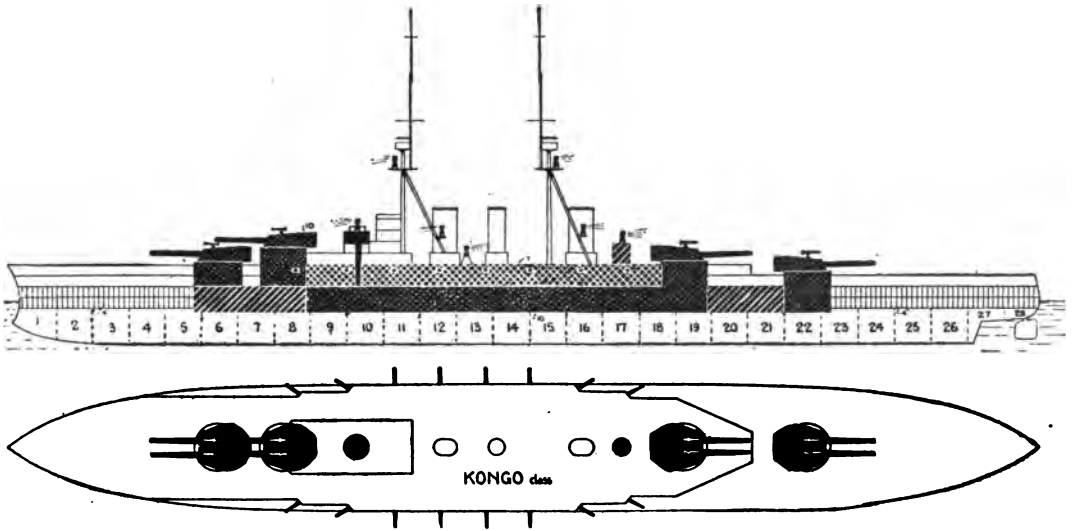

FIG. 17—JAPANESE BATTLE CRUISER KONGO

Length: 704 ft. **Beam:** 92 ft. **Maximum draught:** 29½ ft.
Ahead: 4—14 in. **Broadside:** 8—14 in. **Astern:** 4—14 in.

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In guns it is probable that they are going to larger calibres, as is the United States Navy.

THE RUSSIAN NAVY

In the matter of sea power Russia has been at a disadvantage through being obliged to maintain two separate navies—the Baltic fleet and the Black Sea fleet. This unusual condition has come from closing the Dardanelles to Russian warships. Their strength in first essentials is as follows:

RUSSIAN NAVY—BUILT AND BUILDING

Dreadnoughts	7
Predreadnought battleships	7
Battle cruisers	4

The known building programme of dreadnoughts is as follows:

Comp'd in—	Name	Displacement	Armament	Speed Knots
1914	Sevastopol	23,026	12 12-inch	23.0
1914	Petropavlovsk	23,026		
1914	Poltava	23,026		
1914	Gangoot	23,026		
1914	Imp'sa Maria	22,435	12 12-inch	21.0
1915	Imp. Alex III	22,435		
1915	Ekaterina II	22,435		

Of these the last three are for the Black Sea fleet. It will be observed that the Russian dreadnoughts (Fig. 18) carry four turrets in the centre line with three guns in each turret.

RUSSIAN BATTLE CRUISERS

Comp'd in—	Name	Displacement	Armament	Speed Knots
1916	Navarin	32,000	12 14-inch	25.0
1916	Borodino	32,000		
1916	Ismail	32,000		
1916	Kinburn	32,000		

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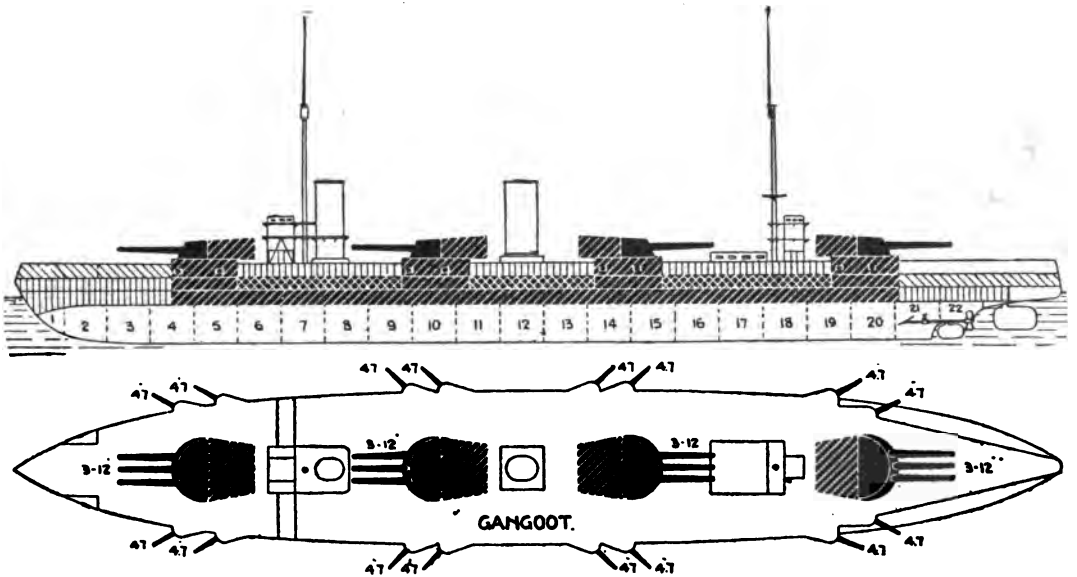

FIG. 18—RUSSIAN DREADNOUGHT GANGOOT

Length over all: 590½ ft. **Beam:** 85½ ft. **Mean draught:** 27½ ft.
Ahead: 3—12 in. **Broadside:** 12—12 in. **Astern:** 3—12 in.

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In these Russian battle cruisers we find again the design of three guns in each turret instead of two.

Knowing the pressure that the war has brought upon Russia, it seems impossible that this building programme of dreadnoughts and battle cruisers has been completed in any degree that would make the Russian Navy a factor in the balance of sea power at this time.

Russia, however, is well provided with destroyers, having an unusual number of these craft for a navy of its size.

THE ITALIAN NAVY

The corresponding strength of the Italian Navy is as follows:

ITALIAN NAVY—BUILT AND BUILDING

Dreadnoughts	9
Predreadnought battleships	7

The Italian Navy has no battle cruisers. The latest construction in the known building programme is as follows:

Comp'd in—	Name	Displacement	Armament	Speed Knots
1913	Giulio Cesare	22,022	13 12-inch	22.5
1914	C'ti di Cavour	22,022	13 12-inch	22.5
1915	Andrea Doria	22,564	13 12-inch	22.5
1915	Duilio	22,564		
1917	Carraciolo	30,000		
1917	Mar'o-Collona	30,000	8 15-inch	25.0
1917	C'ro-Colombo	30,000		
1917	F'co-Morosini	30,000		

The Italian naval constructors have been very skilful —and the above is an advanced programme calculated to make Italy, if not a great naval power, a valuable ally to any naval power. The turret plan shown in Fig. 19 should be noted, as it provides an ingenious way of

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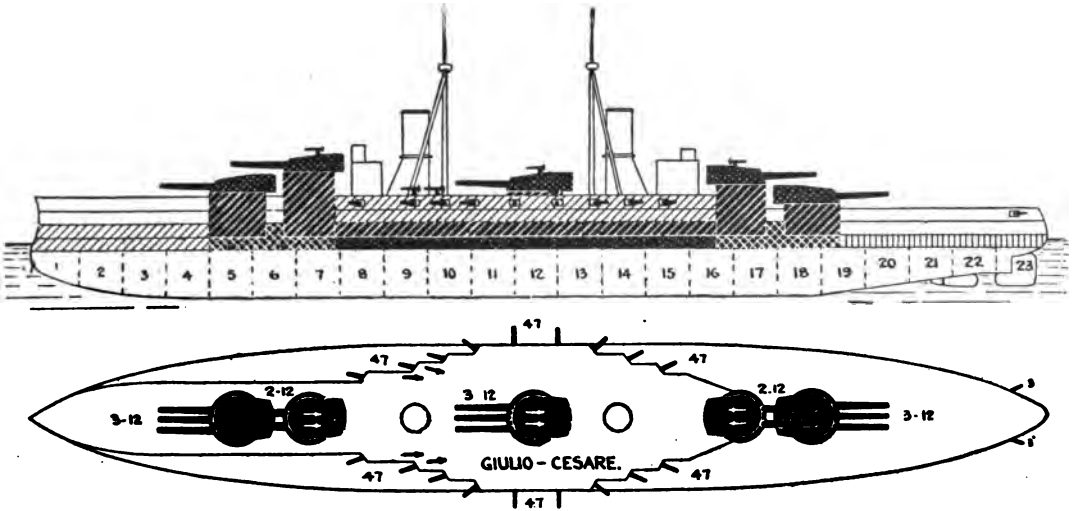

FIG. 19—ITALIAN DREADNOUGHT GIULIO-CESARE

Length: 575½ ft. **Beam:** 91¾ ft. **Mean draught,** 27¾ ft.
Ahead: 5—12 in. **Broadside:** 13—12 in. **Astern:** 5—12 in.

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mounting thirteen heavy guns—and it is unique among the navies of the world.

But, again in the case of Italy, it must be realised that the country has probably been too much occupied in other fields to carry out this ambitious naval programme.

THE AUSTRO-HUNGARIAN NAVY

Austria-Hungary's known strength in first essentials of sea power is given as follows:

Dreadnoughts	8
Predreadnought battleships	6

The Austro-Hungarian Navy has no battle cruisers. The recent known building programme is as follows:

AUSTRO-HUNGARIAN NAVY—BUILT AND BUILDING

Comp'd in—	Name	Displacement	Armament	Speed Knots
1912	Viribus Unitis	20,010	12 12-inch	21.0
1913	Tegetthoff	20,010		
1914	Prinz Eugen	20,010		
1914	Szent Istvan	20,010	12 12-inch	21.0
(1)	One ship	24,500	10 13.5-inch	21.0
(1)	One ship	24,500		
(1)	One ship	24,500		
(1)	One ship	24,500		

[1] Time due to be completed unknown.

It is improbable that this programme has been carried through to any degree. It is much more likely that with German assistance Austria-Hungary has been devoting her energies to submarines—and has thus become a factor in the war of destruction now being waged in the Mediterranean.

For details of naval construction of these Principal Powers see the following tables:

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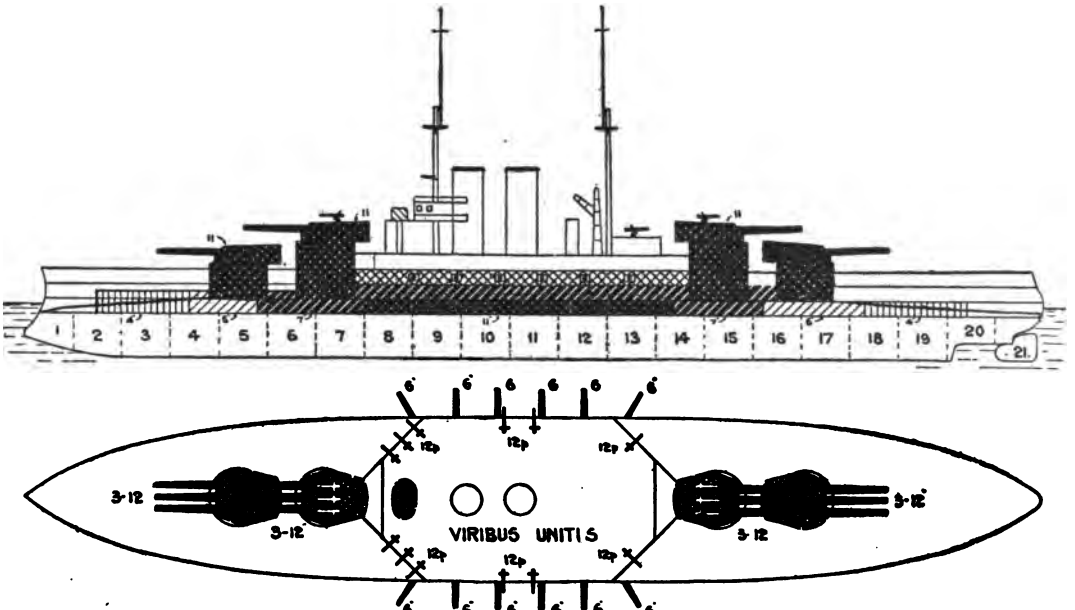

FIG. 20—AUSTRO-HUNGARIAN DREADNOUGHT VIRIBUS UNITIS

Length: 496 ft. Beam: 89½ ft. Mean draught: 27 ft.
Ahead: 6—12 in. Broadside: 12—12 in. Astern: 6—12 in.

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NAVAL STRENGTH, JULY, 1914

	Great Britain				Germany			
	Built		Building		Built		Building	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons
Dreadnoughts	20	423,350	16	421,750	13	285,770	7	187,164
Battleships	40	589,385	..	.....	20	242,800	..	.....
Battle Cruisers	9	187,800	1	28,500	4	88,749	4	112,000
Armored Cruisers	34	406,800	..	.....	9	94,245	..	.....
Cruisers	74	382,815	17	67,000	41	150,747	5	26,900
Destroyers	167	125,850	21	21,770	130	67,094	24	14,400
Submarines	75	30,362	22	17,236	27	14,140	18	14,400
Total Tonnage all Types	2,714,106				1,306,577			
Guns 11″ to 15″	564				320			
Active Personnel	150,609				79,197			
Appropriation for 1913–14	$237,530,459				$112,091,125			

The above table was prepared and arranged by C. H. Foster, U. S. N. A.

(References: Navy Year Book 1914: Brassey: Reports published by office of U. S. Naval Intelligence, etc., etc.)

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NAVAL STRENGTH, JULY, 1914 (*Continued*)

France				Austria-Hungary				Russia			
Built		Building		Built		Building		Built		Building	
No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons
4	92,368	8	193,656	3	60,030	4	93,510	..	.....	7	159,409
18	262,675	..	.....	6	74,613	..	.....	7	98,750	..	.....
..	.....	..	.....	..	.....	..	.....	..	.....	4	128,000
20	201,724	..	.....	2	13,380	..	.....	6	63,500	..	.....
9	46,095	..	.....	5	13,815	5	21,216	9	52,845	8	53,600
84	35,812	3	2,653	18	9,450	..	.....	91	36,748	44	53,664
64	27,940	22	14,766	6	1,686	6	5,370	30	6,506	19	13,284
899,915				347,508				678,818			
204				90				160			
63,846				19,531				52,463			
$90,164,625				$29,928,575 [1]				$117,508,657			

[1] Estimates given in the *Fleet Annual*, 1914, page 112.

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Navy D

	Hungary			
	Built		Building	
	No.	T	No.	Tons (estimated)
Battleships	3	6	5	118,010
Battleships	18	26		
Coast-defens	1			
Battle cruise				
Armored cru	20	20		
Cruisers?	9	4		
Torpedo-boa	84	3	5	21,716
Torpedo boa	135	1		
Submarines	64	27	24	5,886
			6	5,370
Total to		665		150,482
Total t		008		

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"EMDEN" EXPLOITS

Excerpts from articles by Commander L. A. Cotton, U.S.N., and Lieutenant H. von Mücke (Executive officer of "Emden"), the latter translated by Lieutenant-Commander J. H. Klein, Jr., U. S. N.—reprinted by courtesy of the U. S. Naval Institute Proceedings.

IN a war of the size and extent of the Great World War, the magnitude and importance of the major operations are apt to make one overlook operations of lesser military importance in other fields that may be very instructive to those interested in the art of war, and that may illustrate principles of universal application. Of such a nature seem to be the exploits of the *Emden* in the Far East during the first few months of the war.

The *Emden* was a small German cruiser of 3600 tons displacement, having two masts and three funnels and armed with ten 4.1-inch and eight 5-pounder guns and two submerged torpedo tubes. Her speed was about 25 knots and her maximum coal capacity 900 tons.

In the early days of August, 1914, the little *Emden* was in the harbour of Tsingtao in the German leased territory of Kiaochow in the province of Shantung, China. She did not remain there for many days, however, for on August 6 she inaugurated her war career by capturing a Russian volunteer-fleet vessel near Quelpart Island. The *Emden*

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accompanied her prize into Tsingtao, filled her bunkers and got out at sunrise the next morning.

Of the *Emden's* subsequent movements her Executive officer writes: "During the evening of August 12, we came in the neighbourhood of the island where we expected to meet the cruiser squadron and found the outpost vessels. In the middle lay the powerful cruisers *Scharnhörst* and *Gneisenau*, with colliers alongside busy coaling. Farther to the left the slender *Nürnberg*, also engaged in coaling. Scattered about in the harbour were a number of large and small tenders and auxiliaries of the squadron. The *Emden* was ordered to anchor in the right half of the harbour, close to the flagship. Rousing cheers were exchanged between ships as we passed the other vessels and soon thereafter our anchor splashed—the last time for a long while.

"The captain reported aboard the flagship for orders from the squadron commander, and made the proposal to him to detach the *Emden* from the squadron and to send her to the Indian Ocean to carry on a cruise of 'commerce destruction.'

"The next day saw the squadron in column, followed by the colliers, on an easterly course. The squadron commander had not yet made known his decision in regard to our captain's proposal and we were all eager to know what his conclusions were. Along toward midday several signals were hoisted high on the flagship: '*Emden* detached, wish you much success,' read the signal. In an elegant turn our ship sheered out of column, a 'thank-you' signal for the squadron commander's wishes at the mast head, then a semaphore to the *Markomannia*, 'Remain with *Emden*,' and soon, on an opposite course,

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we lost sight of the other ships of the squadron. All knew that we had seen each other for the last time.

"We had now reached the point where, in order to reach the open ocean, we had to pass through the narrow straits. These straits swarmed with fishing craft and such other small ships. The nights being bright moonlight, the *Emden* was visible for a considerable distance. The captain did not relish the idea of meeting so many sailing vessels. He spoke to me about it, saying that he wished to avoid meeting any sort of ship for fear our presence and course in those waters would become known to everybody. All the English men-of-war had either two or four smokepipes; none had three like the *Emden*. Then I conceived the idea of building us a fourth smokepipe. Immediately I had all the deck-strips brought out. These are rolls of heavy sail cloth, about two meters wide, laid on the decks as a protection to the linoleum. In the upper end we sewed a wooden batten and then hoisted this improvised smokepipe forward of our regular forward smokepipe. As viewed from the side the effect was good. But from forward its appearance was exceedingly faulty; it did not have the necessary thickness of its step-brothers. It was only a few millimeters thick. But in the hurry of that first night, nothing better could be accomplished. I proposed to the captain to build a better fourth smokepipe, to which he agreed. And the next day we began the work. Soon we had built, by means of wooden laths and sail cloth, an elegant smokepipe, and when this was in place we resembled the English cruiser *Yarmouth*. I purposely had the smokepipe made oval as the *Yarmouth* had one that shape. Our trailer *Markomannia* was ordered out to a position

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on our beam, and according to her suggestions (by signal) we improved the position of the fourth smokepipe. We then painted the marks to simulate overheating of the outer casting of the smokepipe, so that from now on we could, at any time, day or night, hoist our fake.

"And so we arrived in the Bay of Bengal at the end of the first week in September. For about five days an English warship, probably the *Minotaur*, steamed parallel to and close by us, as we knew by the strength of her radio signals. By and by her signals became weaker until they ceased entirely. We did not sight her."

The next time the *Emden* was heard from she was in the Bay of Bengal, a matter of 4000 miles from Tsingtao even by direct route and in what may be termed the heart of the enemy's sea area. On September 14 the Italian S. S. *Loredoro* arrived off Calcutta and reported that she had on the previous day been held up by the *Emden*, and on September 16 the British S. S. *Kabinga* arrived with the crews of five other British steamers that had been sunk by the *Emden* in the Bay of Bengal between September 10 and 14.

Since there was no German prize court available, the *Emden* proceeded with her captures as follows: The first ship captured was manned with a prize crew and forced to accompany the *Emden*. Then when the second capture was made the more valuable of the two captured ships was sunk by a mine or by gun fire, after the crew had been removed to the other vessel or to the *Emden*. This procedure was followed with each subsequent capture until the captured personnel became too

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numerous to be accommodated when they were all placed upon the one remaining ship and she was released.

On September 16 it was learned that the *Emden* had coaled on the previous day in False Bay (British) about 120 miles from Calcutta. Three British cruisers and three French destroyers were sent in pursuit, a pursuit that proved to be long if not merry.

On September 18 the quarry was located—but not by a man-of-war—about 20 miles off the mouth of Rangoon River, she having sunk the day before the British S. S. *Clan Matheson.* One Japanese cruiser now joined in the chase, which proceeded apace.

Doubling back across the Bay of Bengal the *Emden* appeared next about a mile off the harbour of Madras at nine o'clock at night on September 22. The Madras light was lighted and working, and the lights of the city were all ablaze. The first intimation to those on shore that an enemy was near was the turning on of the search-lights of the *Emden.* Quickly picking up the large oil tanks of the Burma Oil Company she opened fire upon them. A few salvos and they were burning briskly. Firing ceased, search-lights were extinguished and the *Emden* disappeared into the darkness whence she had come. She had in these few minutes inflicted a damage of more than $100,000.

From Madras she steamed slowly down the coast, appearing off Pondicherry on September 24, having captured and sunk five more British steamers in the meantime. At this stage a British cruiser seems to have been within 50 miles of the *Emden,* but the latter appeared to be able to determine with fatalistic accuracy alike

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where enemy merchantmen were and men-of-war were not.

About this time, a Russian cruiser joined in the "*Emden* hunt," but unrestrained the *Emden* passed out of the Bay of Bengal, around Ceylon, and lay athwart the Aden-Colombo trade route. To the westward of Ceylon up to September 27 she sank five more British steamers and captured a collier with 7000 tons of Welsh coal.

During the first two weeks of October the *Emden* was rumoured to be in the Makassar Strait, each of Borneo, at Padang on the Straits of Malakka and southeast of Sumatra, but in reality she seems to have been far away at Diego Garcia in the Chagos Archipelago. There she cleaned her boilers, was heeled over and had her bottom scraped and painted as far as practicable. Then she steamed north again to near the Laccadive Islands. Here from October 15 to 19 she sank five more steamers and a large Tasmanian dredger and captured another large collier. Meanwhile two more Japanese cruisers and one more Russian cruiser joined the searching force.

All trace of the *Emden* was lost for ten days, and she made her next appearance 1700 miles from where she had been last reported.

At early dawn on October 29 the quiet of a sultry summer night still hung over the harbour of Penang (British). The puffing little tugs and launches and the many sampans that give to eastern harbours their appearance of unusual animation, lay moored to the wharves or anchored near by, and sleep still held alike the people ashore and afloat. It was the hour so well known to all sailors at which a lamp is worse than useless, yet without

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which objects can be seen but dimly. The mist of the tropical morning began to lift from the harbour, slowly rolling up as though it were a curtain being lifted from a mammoth stage whereon some terrible tragedy was soon to be enacted.

Slowly from around the point to the eastward a steamer appeared, indistinct as to details and vague as to characteristics, but to the trained eye clearly a man-of-war. Any naval officer can picture to himself what followed on board the Russian cruiser *Jemtchug* peacefully lying at anchor in the harbour. Suddenly the quartermaster on watch sings out "Man-of-war standing in from the eastward, sir!" "Make her out," replies the officer of the watch, started from the boredom of the first part of the morning watch. For a moment the quartermaster gazes through his spy glass, and answers "Two-masted cruiser, with four funnels, sir!" "Very well," comes from the officer of the watch, with an admonition to keep a bright lookout on the incoming cruiser, and report her actions. Doubtless the officer of the watch was momentarily alarmed when the ship was first sighted, but he was quickly reassured, for the only cruisers with four funnels in the waters of the Far East were British and Japanese, both friends. Of course, the ship slowly standing in around the point must be the British cruiser *Yarmouth*, thought he, or one of the *Chikuma* class of Japanese cruisers, all known to be in near-by waters. Slowly and with outward calm the stranger stood in for the usual anchorage of the *Yarmouth*, next the berth of the *Jemtchug*. Now she has reached a point on the *Jemtchug's* beam and only about 300 yards away. On the stranger all are tense and alert, while on the *Jemtchug*

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sleep still holds the crew and officers—the last sleep for many, the next few moments proved. Suddenly the German ensign fluttered from the stranger's truck, a flash of light rippled along her broadside and a salvo hurled death and destruction into the inert *Jemtchug*. The tragedy had begun. As those on the *Jemtchug* sprang from their bunks to the sound of steel crashing through steel, of bursting shell and shrieks of pain, a torpedo sent a quiver throughout the ship as it let loose its energy beneath her. Torn by shell and sundered by torpedo and listing badly, the *Jemtchug* began to sink at once, but a few more salvos in rapid succession and a second torpedo made assurance doubly sure as the curtain of smoke rolled down where the curtain of mist had so recently lifted. When in turn the curtain of smoke began to lift, only the masts of the *Jemtchug* were visible above the blood-stained water, as the struggling survivors cried for help, which the now wide-awake harbour promptly gave. Disappearing out the western entrance of the harbour was the instrument of destruction, the *Emden*, for the stranger was none other than she. With the aid of a dummy funnel and the artistic use of paint and canvas she had succeeded in her disguise as the *Yarmouth* in the early morning light, and now was rapidly disappearing from view unscathed and undaunted.

The engagement, if engagement it may be called, lasted scarcely a quarter of an hour, but the destruction of the *Jemtchug* was complete. Her casualties reached the total of one officer and 84 men killed and two officers and 112 men wounded, being approximately 60 per cent of her complement.

As the *Emden* steamed out of the harbour she fired on

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a patrol boat, but only damaged her slightly. Outside she came upon the outer-patrol, the French destroyer *Mousquet*, and quickly sank her by gun fire. She stopped long enough to pick up the survivors of the *Mousquet*, 36 men and officers, and further out stopped a British steamer to which she transferred them. Then she again disappeared into her habitat, the high sea. Two French destroyers at anchor in Penang harbour quickly raised steam and gave chase, but in vain, for the *Emden* was not seen again for more than 10 days.

After the Penang raid, two more cruisers, two gunboats, three destroyers and an armed merchant cruiser were added to those exclusively engaged in searching for the *Emden*. This brought the number so engaged up to 19 all told, and in addition a large force was being used in convoy duty in the Far East, almost entirely on account of the *Emden's* activities.

The next exploit of the *Emden* brought to an end her eventful career. At daylight on November 9 she ran in for the harbour on South Keeling Island in the Cocos or Keeling group. She still had her dummy funnel rigged, but its effectiveness as a disguise had vanished with the Penang exploit. The harbour on South Keeling is an important British submarine cable and radio station. As soon as the *Emden* was sighted, the word was cabled to London, Adelaide, Perth and Singapore, but what was more important, it was flashed into the air by radio that all who could might hear.

Passing near the Cocos Islands was an army expedition from Australia, bound for the Suez Canal and with it, thanks largely to the *Emden* menace, was a strong naval convoy. The *Emden* used her radio outfit to the

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best of her ability to interfere with the message being sent, but the keen ear of the radio operator on the British cruiser *Minotaur* caught it just the same. One of the units of the convoy was the Australian cruiser *Sydney*. Faster, larger and more powerful than the *Emden*, she was just the ship for the job at hand, and away she steamed full speed for South Keeling and the *Emden*.

Meanwhile the *Emden* had entered the harbour and immediately landed a party of five officers, seven petty officers and 35 men, who proceeded to destroy the radio and cable-stations. The *Emden* stood back to the harbour entrance to keep watch. Apparently her captain was somewhat worried about the radio message that had been sent, for at 8.45 he steamed in again and recalled his landing force by flag signals and by siren. The party did not respond promptly enough, and at 9.30 the *Emden*, leaving her landing party behind, headed out at full speed as the *Sydney* came charging up.[1]

The action began at the harbour entrance at a range of only about 4000 yards. Before she turned to head away, the *Emden* fired a broadside salvo that injured both fire control stations on the *Sydney* and destroyed one of her range finders. The *Sydney* had 2 knots superiority in speed, and she also had 6-inch guns against the *Emden's* 4.1-inch guns. Slowly the *Sydney*

[1] The *Emden* landing force consisting of five officers, seven petty officers and thirty-seven men, seized the schooner *Ayesha*, and sailed for Arabia. On the 16th of December the *Ayesha*, was wrecked in Seaflower Channel and the crew transferred to the Lloyd liner *Choising*. Finally they were landed on the Arabian coast of the Red Sea, made their way overland to Turkey, and thence back to Germany.

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hauled out and up, and brought her broadside to bear, almost out of range of the *Emden's* battery. Soon the *Emden* lost a funnel, and almost immediately thereafter a mast. Then another funnel went by the board, and fire broke out aft. Handicapped by her landing party left ashore, outranged and outstripped by her larger adversary, the *Emden* ran on the reef at North Keeling. With flag still flying, and burning fiercely, she still continued firing her one available gun, and not until the *Sydney* had reluctantly fired three more salvos into her, was the flag hauled down on the mass of blackened and twisted steel that had been the *Emden*. She made a game fight against heavy odds, as is freely admitted by her vanquishers.

The casualties on the *Emden*, as is usual with the vanquished in a naval action, were enormous, only four officers and about 75 men being saved, and a number of these were wounded. The *Sydney* was but little damaged, and her casualties amounted only to three killed and 15 wounded.

ITINERARY OF *EMDEN*

Location	1914	Remarks
Yellow Sea	August 2	Outbreak of war
Tsingtao (arrived)	August 5[1]	
Tsingtao (left)	August 7	
Met fleet, probably at Lamotrek Island (Caroline group)	August 12	
Entered Bay of Bengal	September 4[1]	Route uncertain, Aug. 12-Sept. 4
Off Calcutta, India	September 10-14	
Off Rangoon	September 18[1]	
Madras	September 22	Bombardment
Off Colombo	September 30	
Diego Garcia	October 5-10[1]	
Off Minokoi Island	October 15-20	
Penang	October 28	Sank *Zemtchug* and *Mousquet*
Straits of Sunda	November 1-6[1]	
Keeling, Cocos Island	November 9	Destroyed by Australian cruiser *Sydney*

[1] Indicates approximate dates.
The *Emden* caused in all a direct monetary loss of more than $25,000,000.

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AMERICA'S PART IN THE DEVELOPMENT OF NAVAL WEAPONS AND TACTICS

By T. G. Frothingham, reprinted by courtesy of the United States Naval Institute Proceedings.

ALTHOUGH most of us know that American tactics are being used in this great war, few realise the important part taken by weapons and tactics which had their origin in America. On land the European formal battles and formal fortresses have been superseded by armies manœuvring and intrenching, as developed in our American wars. On the sea American ideas have been even more universally adopted. In their effect on methods and weapons of warfare, our three great wars, the American Revolution, the War of 1812, and the Civil War, are beyond comparison.

Our war for independence, the American Revolution, was destined to differ in tactics from any previous war, and for these new tactics on land and sea the Colonists were well prepared. This is very little understood, even by those who have some historical knowledge; but a careful study of the history of the Revolution shows that, although the Colonists were poor in resources, the American soldiers and sailors had acquired the qualities that gave them victory.

On land, the idea that "embattled farmers" sprang forth fully armed is wrong from every historical point of view. The "French wars" had given our people the

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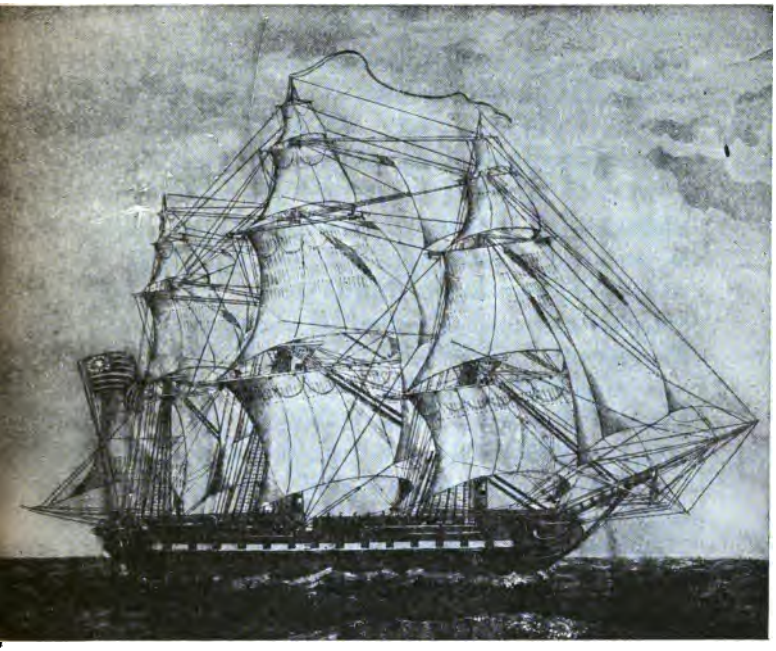

U. S. S. "CONSTITUTION" ("OLD IRONSIDES")

From the Print by Bowen in the Collection of the Marine Museum, Boston, Mass. *By Courtesy of the Society.*

The Symbol of the Spirit of the United States Navy.
The Ancestor of the Modern Dreadnought.

U. S. S. "Constitution"	1797
U. S. S. "Niagara"	1856
U. S. S. "Monitor"	1862
U. S. S. "Roanoke"	1863
U. S. S. "Michigan"	1909
U. S. S. "Pennsylvania"	1916

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right preparation for the Revolution. Scattered through all the Colonies were officers and men who had served in the French and Indian War. Consequently, from Washington down, through the personnel of our Continental Army, were men who had learned the lesson of tactics adapted to this continent. They had also learned, many of them from bitter experience, that such tactics were very effective against the British Army. On the sea the Colonists had another element of preparedness which is not generally appreciated. Nowhere in the world were there hardier and more intelligent seamen. Their ships had been on every sea, and American designers were already noted for the speed of their ships. American sailors all over the world had gained the experience that was destined to make them so resourceful against their enemies. Many of them had been fighting in every kind of naval warfare. They were thus especially well equipped for war against a superior naval power, in which ingenuity and daring were necessary qualities.

On land, the first action of the Revolutionary War was prophetic of great changes of tactics. The Lexington and Concord fight showed the helplessness of the old formal school against a line of battle in extended order, taking advantage of every natural shelter, never giving a set battle but attacking, here, there, and everywhere.

On the sea, it was the same story. Harassing tactics were adopted by the Americans in naval warfare. With the poor resources at their command, the Colonists could not hope for a strong navy, and the number of ships commissioned in the United States Navy was small. But American naval vessels boldly sailed into the well guarded British seas, and actually harried the British

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coasts. These raids, culminating in the exploits of Paul Jones and the fight off Flamborough Head, had a serious effect on the British public.

Our Navy also did damage to British commerce, and here another class of American ships was of great tactical value. There being so few naval ships to give service to our seamen, private enterprise began to fit out ships. Soon a swarm of privateers was scattered over the seas, preying on the British merchant marine. English insurance rates were raised, and merchants were even deterred from shipping goods at any rate of insurance. The American privateers captured or destroyed about six hundred British ships of the value of $18,000,000—very great losses for those days.

"In all the memorials presented to Parliament the argument used to bring about peace was the unprecedented destruction of English commerce," [1] and many authorities believe this argument of commerce destroying by the United States Navy and American privateers did more to gain independence than any other factor in the war.

Probably, however, the most extraordinary event in the Revolution, in relation to the present war, was the first use of the torpedo and the submarine. Various forms of mines had been tried before with indifferent success, but nothing approaching the torpedo as used in the present war.

In 1775 David Bushnell of Connecticut, who graduated from Yale that year, built the "diving boat" known as the "American Turtle." Its design was astonishingly modern in many ways. It was made of iron plates,

[1] Maclay.

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propelled by a screw, and guided by a compass made visible by phosphorus. The torpedo was carried outside, to be attached to the enemy ship, and then cast loose. The action of casting off started a clockwork, which gave the submarine time to get away to a safe distance.

This submarine and torpedo were first tried against the *Eagle*, a 64-gun ship, lying off New York. The operator in the submarine found difficulty in attaching the torpedo, which contained 100 lbs. of powder, and the explosion was not near enough to the *Eagle* to cause any damage. It was again tried against the *Cerberus* at New London. The submarine missed the large ship, but blew up a schooner that lay near her, with several of her people killed. It was Bushnell who in 1778 set afloat torpedoes against the British shipping in the Delaware River near Philadelphia. They were in kegs and did little damage, but inspired the amusing poem "The Battle of the Kegs," written at the time.

These attempts with the submarine and the torpedo, although they did very little actual harm, caused so much alarm and kept the enemy ships away from narrow waters to such an extent, that it is perfectly fair to say that the submarine and torpedo had a tactical value in the Revolutionary War.

Thus it will be seen that in American warfare on the seas, in the Revolution, are found the germs of many of the most important naval tactics of the present war—tactical use of the torpedo, tactical use of the submarine, commerce destroying as a factor in war, raids upon the enemy's coasts by a weaker navy.

Our second war with England, the War of 1812,

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AMERICAN LETTER OF MARQUE BRIG "GRAND TURK" (14 GUNS) OF SALEM SALUTING MARSEILLES, 1815

From the Painting by Roux in the Collection of the East India Marine Society of Salem. *By Courtesy of the Society.*

found the Americans totally unprepared on land. The generation of the Revolution had passed away. There was no element in the population with any experience in war, except a few Indian fighters in the western part of the United States. On the sea, things were very different. Our seamen had become even more expert in the interval between the two wars, our ships had maintained their superiority in speed, and our privateers repeated the damage of the Revolution, but on a larger scale. The American privateers captured or destroyed in this war no less than thirteen hundred British vessels of the value of

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$39,000,000. Such losses were unprecedented, and this destruction of commerce won us an advantageous peace.

The following from the London *Times* is enough to show the effect of these losses on the public mind:

"Lloyd's list contains notices of upward of five hundred British vessels captured in seven months by the Americans. Five hundred merchantmen and three frigates! Can these statements be true? And can the English people hear them unmoved?" The reference to the loss of "three frigates" is comment on another offensive developed by the Americans on the sea, which was the beginning of great changes in naval tactics.

The United States Navy had only twenty-three vessels in commission in the War of 1812, including the squadrons of Perry and McDonough on the lakes, but in this small navy were concentrated skilled officers and men. Our Navy had gained experience of warfare in the Tripolitan War, etc., and it was far ahead of its time in construction and armament.

Our naval constructors, with an intuition almost prophetic, had built a class of frigates, of which the *Constitution* is best known, and placed 24 pounders on them. Such an armament was ridiculed abroad, and it was predicted that such ships would be useless—but, in the War of 1812, these frigates became the wonder of the world. Another extract from the London *Times* shows again the state of the public mind—"The fact seems to be established that the Americans have some superior mode of firing." The "fact" that the *Times* could not understand was the great advance in naval construction shown by these frigates of the United States Navy. This ad-

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AMERICAN ARMED BRIG "TENEDOS," OF BOSTON, AT SMYRNA, JULY 4, 1834.

vanced design by American naval constructors was the birth of the "All big-gun ship" idea, which was destined to dominate naval construction; and the *Constitution* may fairly be called the ancestor of the modern dreadnought.

In the War of 1812 the American inventions of the torpedo and the submarine were of tactical value, although not in actual use. Robert Fulton had attempted to develop the Bushnell inventions, at first for the French and then for the English; but he had returned to America discouraged. There was some aid voted for his machines, but nothing was ever done with them in actual warfare. However, as in the Revolution, the idea that the Americans possessed such dangerous weapons proved a good defence for portions of our coast.

In the Mexican War, as there was no navy to oppose

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U. S. S. "NIAGARA"

From the lithograph by Currier and Ives in the collection of the Marine Museum, Boston, Mass. *By Courtesy of the Society.*

Carries 12 Dahlgren Guns, weighing 14 tons, each 11 inches in diameter in the bore, throwing a solid shot of 270 lbs. or a shell of 180 lbs. a distance of four miles. This was a very powerful armament for the times.

> our operations, the use of our navy, although important, did not develop tactical changes. Yet it is a curious fact that steamers were then first used in naval warfare.[1] In the same spirit of progress that had placed the heavy guns on the *Constitution*, the United States Navy built steam frigates, the *Niagara*, *Wabash*, etc., which had the most powerful armament of their class, holding

[1] Soley.

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AMERICAN ARMED BARQUE "STAMBOUL," OF BOSTON, AT MARSEILLES, 1844.

fast to our Navy's consistent policy of making the gun all-important.

The Civil War brought about still greater advances in American heavily armed warships, which revolutionised naval ships and naval tactics throughout the world. The attack in Hampton Roads on the Union fleet by the *Merrimac*, converted into the casemate ironclad *Virginia* by the Confederates, showed decisively the helplessness of wooden ships against armoured ships. The fight that followed between the *Virginia* and the first turret ship, the *Monitor*, was the first challenge to guns in casemates by guns in turrets. The construction of the epoch-making *Monitor* had been hurried, and she was defective in many ways. Consequently, although the *Monitor* saved the Union fleet, the question of superiority between the two types remained undecided in many minds.

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U. S. S. "PENNSYLVANIA" (1st) 1837, Ship-of-the-line (three decker)

From the Lithograph by N. Currier in the Collection of the Marine Museum, Boston, Mass. *By Courtesy of the Society.*

Rate, 120 guns. 16, 8 in. 104, 32 pr. Total, 120. Complement, 1,100. Tonnage, 3,241. Laid down, 1822. Completed, 1837, Philadelphia. Cost, $694,500. Annual cost in commission, $382,432. Note: Originally this Pennsylvania carried 140 guns. The above data are quoted from the Navy Register of July 1, 1850.

The less known fight in Wassaw Sound in 1863 established the superiority of a few big guns in turrets over a greater number in casemates. The *Atlanta*, a Confederate casemate ironclad of the type of the *Virginia*, came out to destroy two monitors, with two excursion steamers to watch the destruction. The monitor *Weehawken* fired just five shots—and the contest was ended

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U. S. S. "PENNSYLVANIA," 1916

Guns—12, 14 in. 22, 5 in. Total, 34. Complement, 1,100. Tonnage, 32,567. Laid down, 1913. Completed, 1916. Built at Newport News. Cost, $14,000,000.

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for all time in favour of big guns in turrets. The all-big-gun ship commands the sea in this war—and the big guns in turrets have never been supplanted.

In the *Monitor* type, from one to two turrets was but a step, and many such monitors were built. Then came the *Roanoke* (1863), another stage in the development of the *Monitor*. The *Roanoke* was a "sea-going turret vessel" with three turrets, all aligned over the keel. Here were the essentials of the dreadnought of to-day,[1] and this American design of big guns in turrets, aligned over the keel, has prevailed over all other types of armoured warships.

Foreign navies have been reluctant to accept this design. They have built all kinds of armoured ships, and on their turret vessels used various arrangements of the turrets. English and German dreadnoughts, designed less than ten years ago, have other dispositions of the turrets; but, in the latest classes of dreadnoughts, all foreign naval constructors have conformed to the American design of turrets aligned over the keel, from which we have never swerved in mounting our heavy guns.

From the *Constitution* to the first *Pennsylvania*, to the *Niagara*, to the *Monitor*, to the *Roanoke*, to the *Michigan*, to the present fleet flagship *Pennsylvania*, are but steps in the American idea of the all-big-gun-ship.

In the Civil War there was also a great development of the torpedo, and of the submarine. The use of tor-

[1] "For one nowadays to see a drawing of the battery plan of the U. S. S. *Roanoke* is to be reminded that there is nothing new under the sun." Lieut. Com. W. P. Cronan, U. S. N., in U. S. Naval Institute Proceedings.

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pedoes by the Confederates was of real tactical value to them. Their torpedoes were placed, as are mines in the present war, to protect narrow waters and harbours. Covered by artillery fire, these mine fields undoubtedly proved a good defence in many cases against the superior naval power of the North. Many Federal warships were destroyed by them, among these the monitors *Tecumseh* and *Petapsco*. In fact they were a long step toward the great mine fields, which now defend the German bases against the stronger British fleet.

There was also tactical use of the torpedo as a weapon of offence, the Confederate ram *Albemarle* being the most important warship so destroyed. The *Albemarle* was torpedoed in Cushing's daring night attack. As is well known, with a volunteer crew, he attacked in a launch with the torpedo rigged on a spar. This torpedo was exploded by pulling a lanyard.

The Confederates also made great strides in the development of the submarine. Under-sea boats approaching the modern type were built, especially at Charleston. The torpedo was thrust out forward on a spar instead of being ejected from a tube. One type had an engine, but the best known submarine, used at Charleston, was propelled by the crew who sat along the shaft and revolved it by hand. These submarines were fearfully dangerous to their crews, and many crews were drowned in this type of boat. But the Confederates, by the use of the submarine, destroyed one good Federal cruiser, the U. S. sloop of war *Housatonic*, off Charleston in 1864.

This Confederate development of the original American idea of the submarine undoubtedly paved the way for Holland, Lake and others, and led to the recent high

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efficiency of the U-boat, which has become so important a factor in the grand tactics of the present war. As a dangerous commerce destroyer, nothing approaching the U-boats has ever been seen.

The other commerce destroyers, the light German cruisers, which made such destructive raids on British shipping, closely followed the tactics of the Confederate Navy in the Civil War, which was the first navy to make commerce destroying a factor in war after the passing of the privateer.[1]

At the outbreak of the Civil War the Confederate Government hoped to create a fleet of privateers. This proved impossible. The South did not have the ships, and privateering was not of much importance in the war. The South then tried new tactics, and the Confederate Navy commissioned warships whose mission was commerce-destroying.

These cruisers, *Sumter*, *Alabama*, *Florida*, *Georgia*, etc., almost drove the United States flag from the seas. With the command of the sea hopelessly against them, their raids were carried on with the greatest ingenuity and daring, and it was very difficult to catch them.

In the present war the German cruisers imitated the tactics of these Confederate commerce-destroyers, and did a great amount of damage, with the same control of the sea against them. The *Alabama* and the *Emden* will always be associated in their kinship of successful audacity.

For the Federals on the sea the hardest task was the blockade of the Confederate coast. Blockades had been

[1] "Privateering is and remains abolished." Declaration of Paris, 1856.

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used before in warfare, and the status of a blockade was well defined.[1] What the United States Navy accomplished was no "cabinet blockade," but an effective blockade such as had never been seen.

Here was one of the longest coast-lines in the world, where harbours and inlets gave every advantage to the blockade-runner. The United States Navy had not ships enough to carry out the task, but, with characteristic energy all kinds of craft were utilised. The steamer *Circassian*, one of the most valuable prizes of the war, was actually captured by a Fulton ferry-boat. At first the blockade was de facto, as different portions of the coast were policed and notified of the blockade, but in an astonishingly short time the long coast-line was effectively hemmed in. "As to the legal efficiency of the blockade after the first six months there can be no question."[2]

This was only the beginning of the undertaking. Great profits offered inducements to blockade-runners. After the blockade became stringent and ships were being constantly seized on the high seas, attempts were made to evade capture by clearing for one of the available neutral ports, touching there, and then trying to run into a Confederate port. Bermuda, Nassau, Havana, and Matamoras were these ports, of which Nassau was much the most active. The idea was that the claim of neutral destination would protect the ship for most of its voyage, and it would only be in danger in the short run between the neutral port and the Southern port.

[1] "A blockade to be legal must be effective." Declaration of Paris.

[2] Prof. J. R. Soley, U. S. N.

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This practice proved easy to stop, as the character of cargo and evidence of final destination brought condemnation in the courts. This evidence was most difficult in the case of Matamoras, the only town of importance on the Confederate southern border, but so general became the forfeiture of ships and cargoes that some other evasion was necessary.

The next scheme tried was clearance for the neutral ports, and then trans-shipment at the neutral port. The return cargoes were to be handled in the same way. "But here again the courts stepped in, and held that though a trans-shipment was made, even after landing the cargo and going through a form of sale, the two voyages were parts of one and the same transaction, and the cargo from the outset was liable to condemnation, if the original intention had been to forward the goods to a blockaded port. Nor did the decision stop here. As all property, both ship and cargo, is confiscated upon proof of breach of blockade, it was held that ships carrying on this traffic to neutral ports were confiscable, provided the ultimate destination of the cargo to a blockaded port was known to the owner. In the words of the Chief Justice of the Supreme Court, 'The ships are planks of the same bridge.'" [1]

The last resort of the blockade-runners was most ingenious, to break the voyage by shipping to a Federal port, then to a neutral port, then to the Confederate port. Goods were shipped to New York by regular steamship lines, thence to Nassau, to be sent to the South. This was ended, when it was observed that trade with Nassau and Bermuda was abnormal, by orders issued to the col-

[1] Soley.

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lectors of customs to refuse clearance to vessels whose cargoes were in danger of falling into the hands of the enemy, and to require owners to give ample security where there was ground for apprehension that cargoes were destined for the enemy's use.

These orders were general and named no particular ports. Yet the "Merchants of Nassau" complained of this "unjust discrimination" and persuaded Earl Russell to take up the subject diplomatically. The correspondence that followed showed so plainly that "the trade of the Bahamas" was blockade-running, that the British Government "derived little satisfaction," and the traffic was ended.

Thus were overcome difficulties, physical and legal, that seemed insuperable. The amount of harm done to the South by these perfected blockading tactics cannot be estimated.

This well established case of successful legal blockading tactics was at the command of the British Government at the outbreak of this war. Enforcement of a legal blockade against the Teutonic alliance would have been very difficult. Instead of trying this, Great Britain attempted in the beginning of the war to keep goods from the Teutonic allies by using her command of the sea, and an increasing list of contraband. Great Britain is now avowedly trying to imitate the blockade of our Civil War.

The American invention and development of the aeroplane is so recent that there is no need to describe it.

It is impressive to sum up these American contributions to the naval weapons and tactics of to-day.

The development of the all-big-gun ship.

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The tactical superiority of the armoured ship.

The tactical superiority of guns in turrets—and of turrets aligned over the keel.

The tactical use of the torpedo.

The tactical use of the submarine.

Commerce destroying as a factor in warfare.

Raids of an enemy's coasts by an inferior navy.

Establishment of a legal blockade of a long coast line.

The invention and development of the airplane.

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